

**Figure 1A.** Amino acid sequence of secreted ColoUp1 protein  
(I) (SEQ ID NO: 1)

TVAAGCPDQSPQLPWNPGHDQDHHVHIGQGKTLTSSATVYSIHISEGGKLVKDHD  
EPIVLRTRHILIDNGGELHAGSALCPFQGNFTIILYGRADEGIQPDPIYGLKYIGVGKG  
GALELHGQKKLSWTFNLKTLHPGGMAEGGYFFERSWGHARGVIVHVIDPKSGTVIHSDFR  
DTYRSKKESERLVQYLNAPVDGRILSVAVNDEGSRNLDDMARKAMTKLGSKHFLHLGFR  
HPWSFLTVMGNPSSSVEDHIEYHGHRGSAAARVFKLFQTEHGEYFNVSLSSEWVQDVEW  
TEWFDHDKVSQTKGGEKISDLWKAHPGKICNRPIDIQATTMDGVNLSTEVVYKKGQDYR  
FACYDRGRACRSYRVRFLCGKPVRPKLTVTIDTNVNSTILNLEDNVQSWKPGDTLVIA  
TDYSMYQAEFFQVLPCRSCAPNQVKVAGKPMYLIHIGEEIDGVDMAEVGLLSRNIIVMG  
EMEDKCPYRNHICNFFDFDTFGGHIKFAFGKAAHLEGTELKHMGOQLVGQYPIHFHL  
AGDVDERGGYDPPTYIRDLSIHHTFSRCVTVHGSNGLLIKDVVGYNLSLGHCFETEDGPE  
ERNTFDHCLGLLVKSGTLLPSDRDSKMCKMITEDSYPGYIPKPRQDCNAVSTFWMANPN  
NNLINCAAAGSEETGFWFIFHHVPTGPSVGMYSYSEHIPLGKFYNNRAHSNYRAGMI  
IDNGVKTTEASAKDKRPFLSIISARYSPHQDADPLKPREPAIRHFIAYKNQDHGAWLR  
GGDVWLDSCRADNGIGLTLASGGTFPYDDGSKQEIKNLSLFVGESGNVGTMMNDNRIGW  
PGGLDHSGRTLPIGQNFPIRGIQLYDGPINIQNCTFRKFVALEGRHTSALAFLNNAWQ  
SCPHNNVTGIAFEDVPITSRVFFGEPGPWFNQDMDGDKTSVFHDVDGVSSEYPGSYLT  
KNDNWLVRHPDCINVPDWRGAICSGCYAQMYIQAYKTSNLRMKIIKNDFPSHPLYLEGA  
LTRSTHYQQYQPVVTLQKGYTIHWDQTAPAEIAIWLINFNKGDWIRVGLCYPRGTTFSI  
LSDVHNRLKQTSKTGVFVRTLQMDKVEQSYPGRSHYYWDEDSGLLFLKLKAQNEREF  
AFCSMKGCEKIKALIPKNAGVSDCTATAYPKFTERAVVDVPMPPKLFGLKTKDHF  
LEVKMESKQHFHFLWNDFAYIEVDGKKYPSSSEDGIQVVVIDGNQGRVVSHTSFRNSIL  
QGIPWQLFNYVATIPDNSIVLMASKGRYVSRGPWTRVLEKLGADRGLKLKEQMAFVGFK  
GSFRPIWVTLDTEDHKAKIFQVVPPIPVVKKKKL

Figure 1B. Amino acid sequence of secreted ColoUp1 protein  
(II) (SEQ ID NO: 2)

AGCPDQSPQLPWNPGHDQDHHVHIGQGKTLTSSATVYSIHISEGGKLVIKDHDEPI  
VLRTRHILIDNGGELHAGSALCPFQGNFTIILYGRADEGIQPDPIYGLKYIGVGKGGAL  
ELHGQKKLSWTFNLKTLHPGGMAEGGYFFERSWGHARGVIVHVIDPKSGTVIHSRFDY  
RSKKESERLVQYLNAVDPGRILSVAVNDEGSRNLDDMARKAMTKLGSKHFLHLGFRHPW  
SFLTVKGNPSSSVEDHIEYHGHRGSAAARVFKLFQTEHGEYFNVSLSSEWVQDVEWTEW  
FDHDKVSQTKGGEKISDLWKAHPGKICNRPIDIQATTMDGVNLSTEVVYKKGQDYRFAC  
YDRGRACRSYRVRFLCGKPVPRPKLTVTIDTNVNSTILNLEDNVQSWKPGDTLVIASDY  
SMYQAEFQVLPCRSCAPNQVKVAGKPMYLIHIGEEIDGVDMAEVGLLSRNIIVMGEME  
DKCYPYRNHICNFFDFTFGGHIKFAFGKAAHLEGTELKHMGOQLVGQYPIHFHLAGD  
VDERGGYDPPTYIRDLSIHHTFSRCVTVHGSNGLLIKDVVGYNLGHCFETEDGPEERN  
TFDHCLGLLVKSGTLLPSDRDSKMCKMITEDSYPGYIPKPRQDCNAVSTFWMANPNNNL  
INCAAAGSEETGFWFIFHHVPTGPSVGMSPGYSEHIPLGKFYNNRAHSNYRAGMIIDN  
GVKTTEASAKDKRPFLSIISARYSPHQDADPLKPREPAIIRHFIAYKNQDHGAWLRGGD  
VWLDSCRFADNGIGLTLASGGTFPPYDDGSKQEIKNLSEFVGESGNVGTEMMDNRIWGP  
LDHSGRTLPIGQNFPIRGIQLYDGPINIQNCTFRKFVALEGRHTSALAFLNNAWQSCP  
HNNVTGIAFEDVPITSRVFFGEPGPWFNQDMDGDKTSVFHDVDGVSSEYPGSYLTKN  
NWLVRHPDCINVPDWRGAICSGCYAQMYIQAYKTSNLRMKIKNDFPSHPLYLEGALTR  
STHYQQYQPVVTLQKGYTIHWDQTAPAEALIWLINFNKGDWIRVGLCYPRGTTFSILSD  
VHNRLKQTSKTGVFVRTLQMDKVEQSYPGRSHYYWDEDSGLLFLKLKAQNEREKFAFC  
SMKGCERIKIKALIPKNAGVSDCTATAYPKFTERAVVDVPMPKKLFGSQLKTKDHFLEV  
KMESSKQHFFHLWNDFAYIEVDGKKYPSSSEDGIQVVVIDGNQGRVVSHTSFRNSILOGI  
PWQLFNYVATIPDNSIVLMASKGRYVSRGPWTRVLEKLGADRGLKLKEQMAFVGFKGSF  
RPIWVTLDTEDHKAKIFQVVPIPVVKKKKL

**Figure 2. Amino acid sequence of secreted ColoUp2 protein  
(SEQ ID NO: 3)**

LQEVHVSKETIGKISAASKMMWCSAAVDIMFLLDGSNSVGKGSFERSKHFAITVCDGLD  
ISPVRVRVGAFQFSSTPHLEFPLDSFSTQQEVKARIKRMVFKGGRTETELALKYLLHRG  
LPGGRNASVPQILIIIVTDGKSQGDVALPSKQLKERGVTVFAVGVRFPWRWELHALASEP  
RGQHVLLAEQVEDATNGLFSTLSSSAICSSATPDCRVEAHPCEHRTLEMVREFAGNAPC  
WRGSRRTLAVLAAHCPFYSWKRVFLTHPATCYRTTCPGPCDSQPCQNGGTCVPEGLDGY  
QCLCPLAFGGEANCALKLSLECRVDLLFLLDSSAGTTLDGFLRAKVFKRFVRAVLSED  
SRARVGVATYSRELLVAVPVGEYQDVPDLVWSLDGIPFRGGPTLTGSALRQAAERGFSG  
ATRTGQDRPRRVVLLTESHSEDEVAGPARHARARELLLLGVGSEAVRAELEETGSPK  
HVMVYSDPQDLFNQIPELQGLCSRQRPQCRTQALDLVFMLDTSASVGPENFAQMOSFV  
RSCALQFEVNPDVTQVGLVVYGSQVQTAFGLDTKPTRAAMLRAISQAPYLGGVGSAGTA  
LLHIYDKVMTVQRGARPGVPAKVVVLTGGRGAEDAAVPAQKLRNNGISVLVVGVPVLS  
EGLRRLAGPRDSLIIHVAAYADLRYHQDVLI EWLCGEAKQPVNLCKPSPCMNEGSCVLQN  
GSYRCKCRDGWEGPHCENRFLRRP

Figure 3. Nucleic acid sequence of ColoUp1 (SEQ ID NO: 4)

CGTGACACTGTCTCGGCTACAGACCCAGAGGGAGCACACTGCCAGGATGGGAGCTGCTG  
GGAGGCAGGACTTCCTCTTCAAGGCCATGCTGACCATCAGCTGGCTCACTCTGACCTGC  
TTCCTTGGGGCCACATCCACAGTGGCTGCTGGGTGCCCTGACCAGAGCCCTGAGTTGCA  
ACCCTGGAACCTTGGCCATGACCAAGACCACCATGTGCATATCGGCCAGGGCAAGACAC  
TGCTGCTCACCTCTTCTGCCACGGTCTATTCCATCCACATCTCAGAGGGAGGCAAGCTG  
GTCATTAAAGACCACGACGAGCCGATTGTTTTGCGAACCCGGCACATCCTGATTGACAA  
CGGAGGAGAGCTGCATGCTGGGAGTGCCCTCTGCCCTTTCCAGGGCAATTTACCATCA  
TTTTGTATGGAAGGGCTGATGAAGGTATTAGCCGGATCCTTACTATGGTCTGAAGTAC  
ATTGGGGTTGGTAAAGGAGGCGCTCTTGAGTTGCATGGACAGAAAAAGCTCTCCTGGAC  
ATTTCTGAACAAGACCCTTCACCCAGGTGGCATGGCAGAAGGAGGCTATTTTTTTGAAA  
GGAGCTGGGGCCACCGTGGAGTTATTGTTTCATGTCATCGACCCCAAATCAGGCACAGTC  
ATCCATTCTGACCGGTTTGACACCTATAGATCCAAGAAAGAGAGTGAACGTCTGGTCCA  
GTATTTGAACGCGGTGCCCGATGGCAGGATCCTTTCTGTTGCAGTGAATGATGAAGGTT  
CTCGAAATCTGGATGACATGGCCAGGAAGGCGATGACCAAATTGGGAAGCAAACACTTC  
CTGCACCTTGGATTAGACACCTTGGAGTTTTCTAACTGTGAAAGGAAATCCATCATC  
TTCAGTGGAAGACCATATTGAATATCATGGACATCGAGGCTCTGCTGCTGCCCGGGTAT  
TCAAATTGTTCCAGACAGAGCATGGCGAATATTTCAATGTTTTCTTTGTCCAGTGAGTGG  
GTTCAAGACGTGGAGTGGACGGAGTGGTTTCATCATGATAAAGTATCTCAGACTAAAGG  
TGGGGAGAAAATTTAGACCTCTGGAAAGCTCACCCAGGAAAAATATGCAATCGTCCCA  
TTGATATACAGGCCACTACAATGGATGGAGTTAACCTCAGCACCGAGGTTGTCTACAAA  
AAAGGCCAGGATTATAGGTTTGCTTGCTACGACCGGGGAGAGCCTGCCGGAGCTACCG  
TGTACGGTTCTCTGTGGGAAGCCTGTGAGGCCCAAACCTCACAGTCACCATTGACACCA  
ATGTGAACAGCACCATTCTGAACCTTGAGGATAATGTACAGTCATGGAACCTGGAGAT  
ACCCTGGTCAATTGCCAGTACTGATTACTCCATGTACCAGGCAGAAGAGTTCCAGGTGCT  
TCCCTGCAGATCCTGCGCCCCCAACCAGGTCAAAGTGGCAGGGAAACCAATGTACCTGC  
ACATCGGGGAGGAGATAGACGGCGTGGACATGCGGGCGGAGGTTGGGCTTCTGAGCCGG  
AACATCATAGTGATGGGGGAGATGGAGGACAAATGCTACCCCTACAGAAACCACATCTG  
CAATTTCTTTGACTTCGATACCTTTGGGGGCCACATCAAGTTTGCTCTGGGATTTAAGG  
CAGCACACTTGGAGGGCACGGAGCTGAAGCATATGGGACAGCAGCTGGTGGGTCAGTAC  
CCGATTCACCTTCCACCTGGCCGGTGTATGTAGACGAAAGGGGAGGTTATGACCCACCCAC  
ATACATCAGGGACCTCTCCATCCATCATACTTCTCTCGCTGCGTCACAGTCCATGGCT  
CCAATGGCTTGTGATCAAGGACGTTGTGGGCTATAACTCTTTGGGCCACTGCTTCTTC  
ACGGAAGATGGGCCGGAGGAACGCAACACTTTTGACCACTGTCTTGGCCTCCTTGTC  
GTCTGGAACCTCCTCCCCTCGGACCGTGACAGCAAGATGTGCAAGATGATCACAGAGG  
ACTCCTACCCAGGGTACATCCCCAAGCCCAGGCAAGACTGCAATGCTGTGTCCACCTTC  
TGGATGGCCAATCCCAACAACCTCATCAACTGTGCCGCTGCAGGATCTGAGGAAAC  
TGGATTTTGGTTTATTTTTTACCACGTACCAACGGGGCCCTCCGTGGGAATGTACTCCC  
CAGGTTATTCAGAGCACATTCCACTGGGAAAATTCTATAACAACCGAGCACATTCCAAC  
TACCGGGCTGGCATGATCATAGACAACGGAGTCAAAACCACCGAGGCCTCTGCCAAGGA  
CAAGCGGCCGTTCTCTCAATCATCTCTGCCAGATACAGCCCTCACCAGGACGCCGACC  
CGCTGAAGCCCCGGGAGCCGGCCATCATCAGACACTTCATTGCCCTACAAGAACCAGGAC  
CACGGGGCCTGGCTGCGCGGCGGGGATGTGTGGCTGGACAGCTGCCGGTTTGTCTGACAA  
TGGCATTGGCCTGACCCTGGCCAGTGGTGGAACTTCCCGTATGACGACGGCTCCAAGC  
AAGAGATAAAGAACAGCTTGTTTGTGGCGAGAGTGGCAACGTGGGGACGGAAATGATG  
GACAATAGGATCTGGGGCCCTGGCGGCTTGGACCATAGCGGAAGGACCTCCCTATAGG

CCAGAATTTTCCAATTAGAGGAATTGAGTTATATGATGGCCCCATCAACATCCAAAAC  
GCACTTTCCGAAAGTTTGTGGCCCTGGAGGGCCGGCACACCAGCGCCCTGGCCTTCCGC  
CTGAATAATGCCTGGCAGAGCTGCCCCATAACAACGTGACCGGCATTGCCTTTGAGGA  
CGTTCCGATTACTTCCAGAGTGTTCTTCGGAGAGCCTGGGCCCTGGTTCAACCAGCTGG  
ACATGGATGGGGATAAGACATCTGTGTTCCATGACGTGACGGCTCCGTGTCCGAGTAC  
CCTGGCTCCTACCTCACGAAGAATGACAACTGGCTGGTCCGGCACCCAGACTGCATCAA  
TGTTCCCGACTGGAGAGGGGCCATTTGCAGTGGGTGCTATGCACAGATGTACATTCAAG  
CCTACAAGACCAGTAACCTGCGAATGAAGATCATCAAGAATGACTTCCCCAGCCACCCT  
CTTTACCTGGAGGGGGCGCTCACCAGGAGCACCCATTACCAGCAATACCAACCGGTTGT  
CACCCCTGCAGAAGGGCTACACCATCCACTGGGACCAGACGGCCCCCGCCGAACCTCGCCA  
TCTGGCTCATCAACTTCAACAAGGGCGACTGGATCCGAGTGGGGCTCTGCTACCCGCGA  
GGCACCACATTCTCCATCCTCTCGGATGTTCACAATCGCCTGCTGAAGCAAACGTCCAA  
GACGGGCGTCTTCGTGAGGACCTTGCAGATGGACAAAGTGGAGCAGAGCTACCCTGGCA  
GGAGCCACTACTACTGGGACGAGGACTCAGGGCTGTTGTTTCTGAAGCTGAAAGCTCAG  
AACGAGAGAGAGAAGTTTGCTTTCTGCTCCATGAAAGGCTGTGAGAGGATAAAGATTAA  
AGCTCTGATTCCAAAGAACGCAGGCGTCAGTGAAGTGCACAGCCACAGCTTACCCCAAGT  
TCACCGAGAGGGCTGTCTGATAGCTGCCGATGCCCAAGAAGCTCTTTGGTTCTCAGCTG  
AAAACAAAGGACCATTCTTGGAGGTGAAGATGGAGAGTTCCAAGCAGCACTTCTTCCA  
CCTCTGGAACGACTTCGCTTACATTGAAGTGGATGGGAAGAAGTACCCCAAGTTTCGGAGG  
ATGGCATCCAGGTGGTGGTGATTGACGGGAACCAAGGGCGCGTGGTGAGCCACACGAGC  
TTCAGGAACTCCATTCTGCAAGGCATACCATGGCAGCTTTTCAACTATGTGGCGACCAT  
CCCTGACAATTCCATAGTGCTTATGGCATCAAAGGGAAGATACGTCTCCAGAGGCCCAT  
GGACCAGAGTGCTGGAAAAGCTTGGGGCAGACAGGGGTCTCAAGTTGAAAGAGCAAATG  
GCATTGTTGGCTTCAAAGGCAGCTTCCGGCCCATCTGGGTGACACTGGACACTGAGGA  
TCACAAAGCCAAAATCTTCCAAGTTGTGCCCATCCCTGTGGTGAAGAAGAAGAAGTTGT  
GAGGACAGCTGCCGCCCGGTGCCACCTCGTGGTAGACTATG

Figure 4. Nucleic acid sequence of ColoUp2 (SEQ ID NO: 5)

GCCCCCTGGCCCGAGCCGCGCCCGGGTCTGTGAGTAGAGCCGCCCCGGGCACCGAGCGCT  
GGTCGCGCGCTCTCCTTCCGTTATATCAACATGCCCCCTTTCTCTGTTGCTGGAAGCCGTC  
TGTGTTTTCTGTTTTCCAGAGTGCCCCATCTCTCCCTCTCCAGGAAGTCCATGTAAG  
CAAAGAAACCATCGGGAAGATTTTCAGCTGCCAGCAAAATGATGTGGTGCTCGGCTGCAG  
TGGACATCATGTTTCTGTTAGATGGGTCTAACAGCGTCGGGAAAGGGAGCTTTGAAAGG  
TCCAAGCACTTTGCCATCACAGTCTGTGACGGTCTGGACATCAGCCCCGAGAGGGTTCAG  
AGTGGGAGCATTCCAGTTCAGTTCCTCATCTGGAATCCCCCTTGGATTCATTTT  
CAACCCAACAGGAAGTGAAGGCAAGAATCAAGAGGATGGTTTTCAAAGGAGGGCGCACG  
GAGACGGAACCTTGCTCTGAAATACCTTCTGCACAGAGGGTTGCCTGGAGGCAGAAATGC  
TTCTGTGCCCCAGATCCTCATCATCGTCACTGATGGGAAGTCCCAGGGGGATGTGGCAC  
TGCCATCCAAGCAGCTGAAGGAAAGGGGTGTCACTGTGTTTGCTGTGGGGGTGAGGTTT  
CCCAGGTGGGAGGAGCTGCATGCACTGGCCAGCGAGCCTAGAGGGCAGCACGTGCTGTT  
GGCTGAGCAGGTGGAGGATGCCACCAACGGCCTCTTCAGCACCTTCAGCAGCTCGGCCA  
TCTGCTCCAGCGCCACGCCAGACTGCAGGGTCGAGGCTCACCCCTGTGAGCACAGGACG  
CTGGAGATGGTCCGGGAGTTCGCTGGCAATGCCCCATGCTGGAGAGGATCGCGGCGGAC  
CCTTGCGGTGCTGGCTGCACACTGTCCCTTCTACAGCTGGAAGAGAGTGTTCCCTAACCC  
ACCCTGCCACCTGCTACAGGACCACCTGCCAGGCCCTGTGACTCGCAGCCCTGCCAG  
AATGGAGGCACATGTGTTCCAGAAGGACTGGACGGCTACCAGTGCTCTGCCCGCTGGC  
CTTTGAGGGGAGGCTAACTGTGCCCTGAAGCTGAGCCTGGAATGCAGGGTCGACCTCC  
TCTTCCTGCTGGACAGCTCTGCGGGCACCCTCTGGACGGCTTCCTGCGGGCCAAAGTC  
TTCGTGAAGCGGTTTGTGCGGGCCGTGCTGAGCGAGGACTCTCGGGCCCGAGTGGGTGT  
GGCCACATACAGCAGGGAGCTGCTGGTGGCGGTGCCTGTGGGGGAGTACCAGGATGTGC  
CTGACCTGGTCTGGAGCCTCGATGGCATTCCCTTCCGTGGTGGCCCCACCCTGACGGGC  
AGTGCCTTGCGGCAGGCGGCAGAGCGTGGCTTCGGGAGCGCCACCAGGACAGGCCAGGA  
CCGGCCACGTAGAGTGGTGGTTTTGCTCACTGAGTCACACTCCGAGGATGAGGTTGCGG  
GCCAGCGCGTCACGCAAGGGCGCGAGAGCTGCTCCTGCTGGGTGTAGGCAGTGAGGCC  
GTGCGGGCAGAGCTGGAGGAGATCACAGGCAGCCAAAGCATGTGATGGTCTACTCGGA  
TCCTCAGGATCTGTTCAACCAAATCCCTGAGCTGCAGGGGAAGCTGTGCAGCCGGCAGC  
GGCCAGGGTGCCGGACACAAGCCCTGGACCTCGTCTTCATGTTGGACACCTCTGCCTCA  
GTAGGGCCCGAGAATTTTGCTCAGATGCAGAGCTTTGTGAGAAGCTGTGCCCTCCAGTT  
TGAGGTGAACCCTGACGTGACACAGGTGCGCCTGGTGGTGTATGGCAGCCAGGTGCAGA  
CTGCCCTTCGGGCTGGACACCAAACCCACCCGGGCTGCGATGCTGCGGGCCATTAGCCAG  
GCCCCCTACCTAGGTGGGGTGGGCTCAGCCGGCACCGCCCTGCTGCACATCTATGACAA  
AGTGATGACCGTCCAGAGGGGTGCCCGCCTGGTGTCCCCAAAGCTGTGGTGGTGTCTCA  
CAGGCGGGAGAGGCGCAGAGGATGCAGCCGTTCCTGCCCAGAAGCTGAGGAACAATGGC  
ATCTCTGTCTTGCTCGTGGGCGTGGGGCCTGTCTAAGTGAGGGTCTGCGGAGGCTTGC  
AGGTCCCCGGGATTCCCTGATCCACGTGGCAGCTTACGCCGACCTGCGGTACCACCAGG  
ACGTGCTCATTGAGTGGCTGTGTGGAGAAGCCAAGCAGCCAGTCAACCTCTGCAAACCC  
AGCCCGTGTCATGAATGAGGGCAGCTGCGTCTGTCAGAATGGGAGCTACCGCTGCAAGTG  
TCGGGATGGCTGGGAGGGCCCCCACTGCGAGAACCGATTCTTGAGACGCCCCTGAGGCA  
CATGGCTCCCGTGACAGGAGGGCAGCAGCCGTACCCCTCCCAGCAACTACAGAGAAGGCC  
TGGGCACTGAAATGGTGCCTACCTTCTGGAATGTCTGTGCCCCAGGTCTTAGAATGTC  
TGCTTCCCGCCGTGGCCAGGACCACTATTCTCACTGAGGGAGGAGGATGTCCCAACTGC  
AGCCATGCTGCTTAGAGACAAGAAAGCAGCTGATGTCAACCACAAACGATGTTGTTGAA  
AAGTTTTGATGTGTAAGTAAATACCCACTTTCTGTACCTGCTGTGCCTTGTTGAGGCTA

TGTCATCTGCCACCTTTCCCTTGAGGATAACAAGGGTCCTGAAGACTTAAATTTAGC  
GGCCTGACGTTCCCTTTGCACACAATCAATGCTCGCCAGAATGTTGTTGACACAGTAATG  
CCCAGCAGAGGCCTTTACTAGAGCATCCTTTGGACGG

Figure 5. Nucleic acid sequence of Osteopontin (SEQ ID NO: 6)

GCAGAGCACAGCATCGTCGGGACCAGACTCGTCTCAGGCCAGTTGCAGCCTTCTCAGCC  
AAACGCCGACCAAGGAAAACTCACTACCATGAGAATTGCAGTGATTGCTTTTGCCTCC  
TAGGCATCACCTGTGCCATACCAGTTAAACAGGCTGATTCTGGAAGTTCTGAGGAAAAG  
CAGCTTTTACAACAAATACCCAGATGCTGTGGCCACATGGCTAAACCCTGACCCATCTCA  
GAAGCAGAATCTCCTAGCCCCACAGACCCCTTCCAAGTAAGTCCAACGAAAGCCATGACC  
ACATGGATGATATGGATGATGAAGATGATGATGACCATGTGGACAGCCAGGACTCCATT  
GACTCGAACGACTCTGATGATGTAGATGACACTGATGATTCTCACCAGTCTGATGAGTC  
TCACCATTCTGATGAATCTGATGAACTGGTCACTGATTTTCCCACGGACCTGCCAGCAA  
CCGAAGTTTTTCACTCCAGTTGTCCCCACAGTAGACACATATGATGGCCGAGGTGATAGT  
GTGGTTTATGGACTGAGGTCAAAATCTAAGAAGTTTTCGCAGACCTGACATCCAGTACCC  
TGATGCTACAGACGAGGACATCACCTCACACATGGAAAGCGAGGAGTTGAATGGTGCAT  
ACAAGGCCATCCCCGTTGCCCAGGACCTGAACGCGCCTTCTGATTGGGACAGCCGTGGG  
AAGGACAGTTATGAAACGAGTCAGCTGGATGACCAGAGTGCTGAAACCCACAGCCACAA  
GCAGTCCAGATTATATAAGCGGAAAGCCAATGATGAGAGCAATGAGCATTCCGATGTGA  
TTGATAGTCAGGAACTTTCCAAAGTCAGCCGTGAATTCCACAGCCATGAATTTACAGC  
CATGAAGATATGCTGGTTGTAGACCCCAAAGTAAGGAAGAAGATAAACACCTGAAATT  
TCGTATTTCTCATGAATTAGATAGTGCATCTTCTGAGGTCAATTAAAAGGAGAAAAAAT  
ACAATTTCTCACTTTGCATTTAGTCAAAAGAAAAAATGCTTTATAGCAAAATGAAAGAG  
AACATGAAATGCTTCTTTCTCAGTTTATTGGTTGAATGTGTATCTATTTGAGTCTGGAA  
ATAACTAATGTGTTTGATAATTAGTTTAGTTTGTGGCTTCATGGAACTCCCTGTAAAC  
TAAAAGCTTCAGGGTTATGTCTATGTTTCATTCTATAGAAGAAATGCAAACCTATCACTGT  
ATTTTAATATTTGTTATTCTCTCATGAATAGAAATTTATGTAGAAGCAAACAAAATACT  
TTTACCCACTTAAAAAGAGAATATAACATTTTATGTCACTATAATCTTTTGTTTTTTAA  
GTTAGTGTATATTTTGTGTGATTATCTTTTGTGGTGTGAATAAATCTTTTATCTTGA  
ATGTAATAAGAATTTGGTGGTGTCAATTGCTTATTTGTTTTCCCACGGTTGTCCAGCAA  
TTAATAAAACATAACCTTTTTTACTGCCTAAAAA



Figure 6. Nucleic acid sequence of ColoUp3 (SEQ ID NO: 7)

AAAGGGGCAAGAGCTGAGCGGAACACCGGCCCCGCGTTCGCGGCAGCTGCTTCACCCCTC  
TCTCTGCAGCCATGGGGCTCCCTCGTGGACCTCTCGCGTCTCTCCTCCTTCTCCAGGTT  
TGCTGGCTGCAGTGC GCGGCCTCCGAGCCGTGCCGGGCGGTCTTCAGGGAGGCTGAAGT  
GACCTTGGAGGCGGGAGGCGCGGAGCAGGAGCCCGGCCAGGCGCTGGGGAAAGTATTCA  
TGGGCTGCCCTGGGCAAGAGCCAGCTCTGTTTAGCACTGATAATGATGACTTCACTGTG  
CGGAATGGCGAGACAGTCCAGGAAAGAAGGTCACTGAAGGAAAGGAATCCATTGAAGAT  
CTTCCCATCCAAACGTATCTTACGAAGACACAAGAGAGATTGGGTGGTTGCTCCAATAT  
CTGTCCCTGAAAATGGCAAGGGTCCCTTCCCCCAGAGACTGAATCAGCTCAAGTCTAAT  
AAAGATAGAGACACCAAGATTTTCTACAGCATCACGGGGCCGGGGGCAGACAGCCCCC  
TGAGGGTGTCTTCGCTGTAGAGAAGGAGACAGGCTGGTTGTTGTTGAATAAGCCACTGG  
ACCGGGAGGAGATTGCCAAGTATGAGCTCTTTGGCCACGCTGTGTGTCAGAGAATGGTGCC  
TCAGTGGAGGACCCCATGAACATCTCCATCATCGTGACCGACCAGAATGACCACAAGCC  
CAAGTTTACCCAGGACACCTTCCGAGGGAGTGTCTTAGAGGGAGTCCTACCAGGTACTT  
CTGTGATGCAGGTGACAGCCACGGATGAGGATGATGCCATCTACACCTACAATGGGGTG  
GTTGCTTACTCCATCCATAGCCAAGAACCAAAGGACCCACACGACCTCATGTTCAACAT  
TCACCGGAGCACAGGCACCATCAGCGTCATCTCCAGTGGCCTGGACCGGGAAAAAGTCC  
CTGAGTACACACTGACCATCCAGGCCACAGACATGGATGGGGACGGCTCCACCACCACG  
GCAGTGGCAGTAGTGGAGATCCTTGATGCCAATGACAATGCTCCCATGTTTGACCCCCA  
GAAGTACGAGGCCCATGTGCCTGAGAATGCAGTGGGCCATGAGGTGCAGAGGCTGACGG  
TCACTGATCTGGACGCCCCCAACTCACCAGCGTGGCGTGCCACCTACCTTATCATGGGC  
GGTGACGACGGGGACCATTTTACCATCACCACCCACCCTGAGAGCAACCAGGGCATCCT  
GACAACCAGGAAGGGTTTGGATTTTGGAGGCCAAAAACCAGCACACCCTGTACGTTGAAG  
TGACCAACGAGGCCCTTTTGTGCTGAAGCTCCCAACCTCCACAGCCACCATAGTGGTC  
CACGTGGAGGATGTGAATGAGGCACCTGTGTTTGTCCCACCCTCCAAAGTCGTTGAGGT  
CCAGGAGGGCATCCCCACTGGGGAGCCTGTGTGTGTCTACACTGCAGAAGACCCTGACA  
AGGAGAATCAAAGATCAGCTACCGCATCCTGAGAGACCCAGCAGGGTGGCTAGCCATG  
GACCCAGACAGTGGGCAGGTACAGCTGTGGGCACCCTCGACCGTGAGGATGAGCAGTT  
TGTGAGGAACAACATCTATGAAGTCATGGTCTTGCCATGGACAATGGAAGCCCTCCCA  
CCACTGGCACGGGAACCCTTCTGCTAACACTGATTGATGTCAATGACCATGGCCAGTC  
CCTGAGCCCCGTGAGATCACCATCTGCAACCAAAGCCCTGTGCGCCAGGTGCTGAACAT  
CACGGACAAGGACCTGTCTCCCCACACCTCCCCTTTCCAGGCCAGCTCACAGATGACT  
CAGACATCTACTGGACGGCAGAGGTCAACGAGGAAGGTGACACAGTGGTCTTGTCCCTG  
AAGAAGTTCCTGAAGCAGGATACATATGACGTGCACCTTTCTCTGTCTGACCATGGCAA  
CAAAGAGCAGCTGACGGTGATCAGGGCCACTGTGTGCGACTGCCATGGCCATGTGCGAAA  
CCTGCCCTGGACCCCTGGAAGGGAGGTTTCATCCTCCCTGTGCTGGGGGCTGTCTCTGGCT  
CTGCTGTTCTCTCTGCTGGTGCTGCTTTTGTGGTGAGAAAGAAGCGGAAGATCAAGGA  
GCCCCCTCCTACTCCAGAAAGATGACACCCGTGACAACGTCTTCTACTATGGCGAAGAGG  
GGGTGGCGAAGAGGACCAGGACTATGACATCACCCAGCTCCACCGAGGTCTGGAGGCC  
AGGCCGGAGGTGGTTCTCCGCAATGACGTGGCACCAACCATCATCCCGACACCCATGTA  
CCGTCTCGGCCAGCCAACCCAGATGAAATCGGCAACTTTATAATTGAGAACCTGAAGG  
CGGCTAACACAGACCCACAGCCCCGCCCTACGACACCCTCTTGGTGTTCGACTATGAG  
GGCAGCGGCTCCGACGCGCGTCCCTGAGCTCCCTCACCTCCTCCGCCTCCGACCAAGA  
CCAAGATTACGATTATCTGAACGAGTGGGGCAGCCGCTTCAAGAAGCTGGCAGACATGT  
ACGGTGGCGGGGAGGACGACTAGGCGGCCTGCCTGCAGGGCTGGGGACCAACGTCAGG  
CCACAGAGCATCTCAAGGGGTCTCAGTTCCCCCTTCAGCTGAGGACTTCGGAGCTTGT

CAGGAAGTGGCCGTAGCAACTTGGCGGAGACAGGCTATGAGTCTGACGTTAGAGTGGTT  
GCTTCCTTAGCCTTTCAGGATGGAGGAATGTGGGCAGTTTGACTTCAGCACTGAAAACC  
TCTCCACCTGGGCCAGGGTTGCCTCAGAGGCCAAGTTTCCAGAAGCCTCTTACCTGCCG  
TAAAATGCTCAACCCCTGTGTCCTGGGCCTGGGCCTGCTGTGACTGACCTACAGTGGACT  
TTCTCTCTGGAATGGAACCTTCTTAGGCCTCCTGGTGCAACTTAATTTTTTTTTTTAAT  
GCTATCTTCAAAACGTTAGAGAAAGTTCTTCAAAAGTGCAGCCCAGAGCTGCTGGGCCC  
ACTGGCCGTCCTGCATTTCTGGTTTCCAGACCCCAATGCCTCCCATTTCGGATGGATCTC  
TGC GTTTTTATACTGAGTGTGCCTAGGTTGCCCCTTATTTTTTATTTTCCCTGTTGCGT  
TGCTATAGATGAAGGGTGAGGACAATCGTGTATATGTACTAGAACTTTTTTATTAAAGA  
AACTTTTCCCAGAAAAAAA

Figure 7. Nucleic acid sequence of ColoUp4 (SEQ ID NO: 8)

ATGAAGCACCTGAAGCGGTGGTGGTCGGCCGGCGGCGGCCTCCTGCACCTCACCCCTCCT  
GCTGAGCTTGGCGGGGCTCCGCGTAGACCTAGATCTTTACCTGCTGCTGCCGCCGCCCA  
CCCTGCTGCAGGACGAGCTGCTGTTCTTGGGCGGCCCGGCCAGCTCCGCCTACGCGCTC  
AGCCCCCTTCTCGGCCTCGGGAGGGTGGGGGCGCGCGGGCCACTTGACCCCCAAGGGCCG  
GGAGCTGGACCCTGCCGCGCCGCCGAGGGCCAGCTGCTCCGGGAGGTGCGCGCGCTCG  
GGGTCCCCTTCGTCCCTCGCACCAGCGTGGATGCATGGCTGGTGCACAGCGTGGCTGCC  
GGGAGCGCGGACGAGGCCACGGGCTGCTCGGCGCCGCCCGCCCTCGTCCACCGGAGG  
AGCCGGCGCCAGCGTGGACGGCGGCAGCCAGGCTGTGCAGGGGGGCGGCGGGGACCCCC  
GAGCGGCTCGGAGTGGCCCCCTTGACGCCGGGAAGAGGAGAAGGCACCCGCGGAACCG  
ACGGCTCAGGTGCCGGACGCTGGCGGATGTGCGAGCGAGGAGAATGGGGTACTAAGAGA  
AAAGCACGAAGCTGTGGATCATAGTTCCCAGCATGAGGAAAATGAAGAAAGGGTGTGAG  
CCCAGAAGGAGAACTCACTTCAGCAGAATGATGATGATGAAAACAAATAGCAGAGAAA  
CCTGACTGGGAGGCAGAAAAGACCACTGAATCTAGAAATGAGAGACATCTGAATGGGAC  
AGATACTTCTTTCTCTCTGGAAGACTTATTCAGTTGCTTTCATCACAGCCTGAAAATT  
CACTGGAGGGCATCTCATTGGGAGATATTCTCTTCCAGGCAGTATCAGTGATGGCATG  
AATTCTTCAGCACATTATCATGTAACTTCAGCCAGGCTATAAGTCAGGATGTGAATCT  
TCATGAGGCCATCTTGCTTTGTCCCAACAATACATTTAGAAGAGATCCAACAGCAAGGA  
CTTCACAGTCACAAGAACCATTCTGTCAGTTAAATTCTCATACCACCAATCCTGAGCAA  
ACCCTTCCTGGAACATAATTGACAGGATTTCTTTCACCGGTTGACAATCATATGAGGAA  
TCTAACAAGCCAAGACCTACTGTATGACCTTGACATAAATATATTTGATGAGATAAACT  
TAATGTCATTGGCCACAGAAGACAACCTTTGATCCAATCGATGTTTCTCAGCTTTTTGAT  
GAACCAGATTCTGATTCTGGCCTTTCTTTAGATTCAAGTCACAATAATACCTCTGTCAT  
CAAGTCTAATTCCTCTCACTCTGTGTGTGATGAAGGTGCTATAGGTATTGCACTGACC  
ATGAATCTAGTTCCCATCATGACTTAGAAGGTGCTGTAGGTGGCTACTACCCAGAACCC  
AGTAAGCTTTGTCACTTGGATCAAAGTGATTCTGATTTCCATGGAGATCTTACATTTCA  
ACACGTATTTCATAACCACACTTACCACTTACAGCCAACTGCACCAGAATCTACTTCTG  
AACCTTTTCCGTGGCCTGGGAAGTCACAGAAGATAAGGAGTAGATACCTTGAAGACACA  
GATAGAACTTGAGCCGTGATGAACAGCGTGCTAAAGCTTTGCATATCCCTTTTTCTGT  
AGATGAAATTGTGCGCATGCCTGTTGATTCTTTCAATAGCATGTTAAGTAGATATTATC  
TGACAGACCTACAAGTCTCACTTATCCGTGACATCAGACGAAGAGGGAAAAATAAAGTT  
GCTGCGCAGAACTGTGCTAAACGCAAATTGGACATAATTTTGAATTTAGAAGATGATGT  
ATGTAACCTTGCAAGCAAAGAAGGAAACTCTTAAGAGAGAGCAAGCACAAATGTAACAAAG  
CTATTAACATAATGAAACAGAACTGCATGACCTTTATCATGATATTTTGTAGTAGATTA  
AGAGATGACCAAGGTAGGCCAGTCAATCCCAACCACTATGCTCTCCAGTGTACCCATGA  
TGGAAGTATCTTGATAGTACCCAAAGAACTGGTGGCCTCAGGCCACAAAAAGGAAACCC  
AAAAGGGAAAGAGAAAGTGAGAAGAACTGAAGATGGACTCTATTATGTGAAGTAGTAA  
TGTTCAGAACTGATTATTTGGATCAGAAACCATGAACTGCTTCAAGAATTGTATCT  
TTAAGTACTGCTACTTGAATAACTCAGTTAACGCTGTTTTGAAGCTTACATGGACAAAT  
GTTTAGGACTTCAAGATCACACTTGTGGGCAATCTGGGGGAGCCACAACCTTTTCATGAA  
GTGCATTGTATACAAAATTCATAGTTATGTCCAAAGAATAGGTTAACATGAAAACCCAG  
TAAGACTTTCATCTTGGCAGCCATCCTTTTTAAGAGTAAGTTGGTTACTTCAAAAAGA  
GCAACACTGGGGATCAAATTATTTAAGAGGTATTCAGTTTAAATGCAAAATAGCC  
TTATTTTCATTTAGTTTGTTAGCACTATAGTGAGCTTTTCAAACACTATTTTAATCTTT  
ATATTTAACTTATAAATTTTGCTTTCTATGGAAATAAATTTTGTATTTGTATTAATAA  
AAAAAA

Figure 8. Nucleic acid sequence of ColoUp5 (SEQ ID NO: 9)

ATGAAGTTGGAGGTGTTTCGTCCCTCGCGCGGCCACGGGGACAAGCAGGGCAGTGACCT  
GGAGGGCGCGGGCGGCAGCGACGCGCCGTCCCCGCTGTCGGCGGCGGGAGACGACTCCC  
TGGGCTCAGATGGGGACTGCGCGGCCAAGCCGTCCGCGGGCGGCGGCCAGAGATACG  
CAGGGCGACGGCGAACAGAGTGCGGGAGGCGGGCCGGGCGCGGAGGAGGCGATCCCGGC  
AGCAGCTGCTGCAGCGGTGGTGGCGGAGGGCGCGGAGGCCGGGGCGGCGGGGCCAGGCG  
CGGGCGGCGCGGGGAGCGGCGAGGGTGACGCGAGCAAGCCATATACGCGGCGGCCCAAG  
CCCCCTACTCGTACATCGCGCTCATCGCCATGGCCATCCGCGACTCGGCGGGCGGGCG  
CTTGACGCTGGCGGAGATCAACGAGTACCTCATGGGCAAGTTCCCCTTTTTCCGCGGCA  
GCTACACGGGCTGGCGCAACTCCGTGCGCCACAACCTTTCGCTCAACGACTGCTTCGTC  
AAGGTGCTGCGCGACCCCTCGCGGCCCTGGGGCAAGGACAACTACTGGATGCTCAACCC  
CAACAGCGAGTACACCTTCGCCGACGGGGTCTTCCGCCGCCGCCGCAAGCGCCTCAGCC  
ACCGCGCGCCGGTCCCCGCGCCCGGGCTGCGGCCCCGAGGAGGCCCGGGCCTCCCCGCC  
GCCCCGCCGCCCGCGCCCGCCGCCCGGCCCTCGCCCCGCATGCGCTCGCCCCGCCGCCA  
GGAGGAGCGCGCCAGCCCCGCGGGCAAGTTCTCCAGCTCCTTCGCCATCGACAGCATCC  
TGCGCAAGCCCTTCCGCAGCCGTGCGCTCAGGGACACGGCCCCCGGGACGACGCTTCAG  
TGGGGCGCCGCGCCCTGCCCGCCGCTGCCCGCGTTCCCCGCGCTCCTCCCCGCGGCGCC  
CTGCAGGGCCCTGCTGCCGCTCTGCGCGTACGGCGCGGGCGAGCCGGCGCGGCTGGGCG  
CGCGCGAGGCCGAGGTGCCACCGACCGCGCCGCCCTCCTGCTTGACCTCTCCCGGCG  
GCGGCCCCCGCCAAGCCACTCCGAGGCCCGGCGGCCGGCGGCGCGCACCTGTACTGCCC  
CCTGCGGCTGCCCGCAGCCCTGCAGGCGGCCTTAGTCCGNCGTCCTGGCCCCGCACCTGT  
CGTACCCGGTGGAGACGCTCCTAGCTTGA

**Figure 9.** Nucleic acid sequence of ColoUp6 (SEQ ID NO: 10)

GGCAGATGAAATATAAGATTCATCAACCACATTTGACAGCCCATGGCAGGTTTCCTGTT  
TTCCATCGTCCCTCTGCAGGTCACAGACACACAGAGCCCGTGGCAGGCTCAGCCG  
GGGTCCGGGGCTGCTAACACGGCTACATTCCTCCCCCAGGGCCAAGGGAAATCCTGAG  
CGCAGGCCAGGGTTGTTTGGTTTTGAGGTGTGCTGGGATGAAAGGCACCCTGGAAGTGG  
AAGGTTTCGGTCATTCATTAATTAATTACATCTATAATTGAGGGTTTGTTCCTTAAGAGCG  
AGTCCTTTGAAAGTACTTTCCTTCAAACAGTGACTGCCACAAAGGCATCAGATATTCAC  
CACCTTCTCGGCTGCCTCAGCACAGCAAGCTTTATTCTGGGACCTGAGATCCTGTTCTG  
AGCTGGCTTTCCCTTCTCCAGGCTCGCTCACCCCTCCCTTTAGAGATAGTGGATGGTAAG  
ATGACCAATGCTCAGATTATTCTTCTCATTGACAATGCCAGGATGGCAGTGGATGACTT  
CAACCTCAAGAAATGGAGAAGCATCATGTGCCAAGTGACTTCAATGTCAATGTGAAGGT  
GGATACAGGTCCCAGGAAGATCTGATTAAGGTCCTGGAGGATATGAGACAAGAATATG  
AGCTTATAATAAAGAAGAAGCATCGAGACTTGGACACTTGGTATAAAGAACAGTCTGCA  
GCCATGTCCCAGGAGGCAGCCAGTCCAGCCACTGTGCAGAGCAGACAAGGTGACATCCA  
CGAACTGAAGCGCACATTCCAGGCCCTGGAGATTGACCTGCAGGCACAGTACAGCACGA  
AATCTGCTTTGGAAAACATGTTATCCGAGACCCAGTCTCGGTACTCCTGCAAGCTCCAG  
GACATGCAAGAGATCATCTCCCACTATGAGGAGGAACTGACGCAGCTACGCCACGAACT  
GGAGCGGCAGAACAATGAATACCAAGTGCTGCTGGGCATCAAAACCCACCTGGAGAAGG  
AAATCACCACGTACCGACGGCTCCTGGAGGGAGAGAGTGAAGGGACACGGGAAGAATCA  
AAGTCGAGCATGAAAGTGTCTGCAACTCCAAAGATCAAGGCCATAACCCAGGAGACCAT  
CAACGGAAGATTAGTTCTTTGTCAAGTGAATGAAATCCAAAAGCACGCATGAGACCAAT  
GAAAGTTTCCGCCTGTTGTAAAATCTATTTTCCCCCAAGGAAAGTCCTTGCACAGACAC  
CAGTGAGTGAGTTCATAAAGATACCCTTGGAATTATCAGACTCAGAACTTTTATTTTT  
TTTTTCTGTAAACAGTCTCACCAGACTTCTCATAATGCTCTTAATATATTGCACTTTTCT  
AATCAAAGTGCGAGTTTATGAGGGTAAAGCTCTACTTTCCTACTGCAGCCTTCAGATTC  
TCATCATTTTGCATCTATTTTGTAGCCAATAAACTCCGCCTAGCAAAAAAAAAA

**Figure 10. Nucleic acid sequence of ColoUp7 (SEQ ID NO: 11)**

TTTTTTTTTTAAAAAAGAGGCTTGGTAAGTTTTTGATGCTTAGTTGACTTTTAGCATT  
ATCCAGCATTGTATTATGAACCAGTGAGTACTGTAATTTTCTTCCCTTTCAGAAAG  
ACTCAAAGGGAACATATAAATGTTTCCTATTTTAAATGTGGCAATAGTGTAGCTAACAC  
TGGTACAGACGGAATAAACACACCTCTAATATTCTCCTGAAGATTGGTGATCCAGTTT  
CAAATAAGGTATGGGAAAAACAGATGTTTTCATTATCGCCACTTAATCCTTACTTCCGA  
TTATAATTATACATGTTTGGCTGTAATAACTATACTAAAGCATGCTTGTGAAAGTAGAC  
TTCTACAAGGACAGAAAACCCACAACAACAAAGATCGATCACGAAAGACAAGGCATA

Figure 11. Nucleic acid sequence of ColoUp8 (SEQ ID NO: 12)

CTTTTCTTCCGCACGGTTGGAGGAGGTCGGCTGGTTATCGGGAGTTGGAGGGCTGAGGT  
CGGGAGGGTGGTGTGTACAGAGCTCTAGGACTCACGCACCAGGCCAGTCGCGGATTTTG  
GGCCGAGGCCTGGGTTACAAGCAGCAAGTGCGCGGTTGGGGCCACTGCGAGGCCGTTTTT  
AGAAAAC TGT TTTAAAACAAAGAGCAATTGATGGATAAATCAGGAATAGATTCTCTTGAC  
CATGTGACATCTGATGCTGTGGAAC TTGCAAATCGAAGTGATAACTCTTCTGATAGCAG  
CTTATTTAAAAC TCA GTGTATCCCTTACTCACCTAAAGGGGAGAAAAGAAACCCCATTC  
GAAAATTTGTTTCGTACACCTGAAAGTGTTTACGCAAGTGATT CATCAAGTGACTCATCT  
TTTGAACCAATACCATTGACTATAAAAGCTATTTTTTGAAGATTCAAGAACAGGAAAAA  
GAGATATAAAAAAAGAAAAAGAGGAGGTACCAGCCAACAGGAAGACCACGGGGAAGAC  
CAGAAGGAAGGAGAAATCCTATATACTCACTAATAGATAAGAAGAAACAATTTAGAAGC  
AGAGGATCTGGCTTCCCATTTTTTAGAATCAGAGAATGAAAAAACGCACCTTGGAGAAA  
AATTTTAACGTTTGAGCAAGCTGTTGCAAGAGGATTTTTTAACTATATTGAAAAGCTGA  
AGTATGAACACCACCTGAAAGAATCATTGAAGCAAATGAATGTTGGTGAAGATTTAGAA  
AATGAAGATTTTGACAGTCGTAGATACAAATTTTTTGGATGATGATGGATCCATTTCTCC  
TATTGAGGAGTCAACAGCAGAGGATGAGGATGCAACACATCTTGAAGATAACGAATGTG  
ATATCAAATTGGCAGGGGATAGTTTCATAGTAAGTTCTGAATTCCTGTAAAGACTGAGT  
GTATACTTAGAAGAAGAGGATATTACTGAAGAAGCTGCTTTGTCTAAAAAGAGAGCTAC  
AAAAGCCAAAAATACTGGACAGAGAGGCCTGAAAATGTGACAGGATCATGAATGTCAA  
GGCTTTTATCTTGAGAACATGGTGTCTGGAGTTAAAGGTATTGGCATACTCCACACATC  
TGTACCATTCTTGAGTGATCGCTTAGGAATGAATGTGATTTGAACTCATTCATGTTGAG  
AGGGTGTCAAATTGAGAACCAGGTAGATCCCCACCACCTACAGTAAAAAGGACCCTAAA  
GTAAATTGGTTGAAGAAATTAGATCCCAAAGATTCTTGGTGAATTTTGAAGTCTTCATC  
AGTATATCCATATTAACGAGATGACAGAAGCCAAAGTAATTATGGCAAGTAATGGTT  
TTTATCTTAACTATAAGTTATTTGCTCAAGGGTGTAATGGTCATTACCAAGGCTTTTAG  
AATGCAGTTTCTCATTTGCTGTGGACATGACCATAAAAAAAATTTCCAGTAGGTTTT  
CTATCTGCTACGTTGCTAGCAATCAGCTTATTGGGAACAGTTGATTAAGTGAATAGAA  
ATGCAATACAAATAAAATGTGAACCACATGTGATTTTTCTTTAAAATCAGTGAGATTTG  
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GAGCTCTTAACGCTGTGACCAAAGATGGAAGTTCTCTATAGGAAGCCATAGCACTCCTA  
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TCACAACATGGAATTCCTCGAATAACAATTTATTGACTTTAAATAATTTTGTCTAATGC  
TACATATACACAATTAAAAAACCTTTACACTATTTCTAGAAAGTCAGCATGTATTTTTG  
GCTCGAAGTTTCTCTAGTGTTTTCTGTGGAAGGAATAAAAATTTGAGTTTCAAAAAAAA  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**Figure 12.** Amino acid sequence of full-length ColoUp1 protein (SEQ ID NO: 13)

MGAAGRQDFLFKAMLTISWLTLTCTFPGATSTVAAGCPDQSPPELQPWNPGHDQDHHVHIG  
QGKTLTLLTSSATVYSIHISEGGKLVIKDHDEPIVLRTRHILIDNGGELHAGSALCPFQG  
NFTIILYGRADEGIQPDPIYGLKYIGVGKGGALELHGQKKLSWTFLNKTLPGGMAEGG  
YFFERSWGHARGVIVHVIDPKSGTVIHSDRFDITYRSKKESERLVQYLNAPDGRILSVAV  
NDEGSRNLDDMARKAMTKLGSKHFLHLGFRHPWSFLTVKGNPSSSVEDHIEYHGHARGSA  
AARVFKLFQTEHGEYFNVSLSSSEWVQDVEWTEWFDHDKVSQTKGGEKISDLWKAHPGKI  
CNRPIDIQATTMDGVNLSTEVVYKKGQDYRFACYDRGRACRSYRVRFCLCGKPVPRPKLTV  
TIDTNVNSTILNLEDNVQSWKPGDTLVIASTDYSMYQAEFEQVLPSCRSCAPNQVKVAGK  
PMYLHIGEEIDGVDMAEVLGSLSRNIIVMGEMEDKCPYRNHICNFFDFDTFGGHIKFA  
LGFKAAHLEGTELKHMGGQLVGQYPIHFHLAGDVDERGGYDPPTYIRDLSTHHTFSRCV  
TVHGSNGLLIKDVVGYNLSLGHCFFTEDGPEERNTFDHCLGLLVKSGTLLPSDRDSKMCK  
MITEDSYPGYIPKPRQDCNAVSTFWMANPNNNLINCAAAGSEETGFWFIFHHVPTGPSV  
GMYSPTYSEHIPLGKFYNNRAHSNYRAGMIIDNGVKTTEASAKDKRPFLSIISARYSPH  
QDADPLKPREPAIRHFIAAYKNQDHGAWLRGGDVWLDSCRFDNGIGLTLASGGTFPYD  
DGSQKEIKNSLFGESGNVGTEMMDNRIWGPGLDHSGRTPIGQNFPIRGIQLYDGPI  
NIQNCTFRKFVALEGRHTSALAFLNNAWQSCPHNNVTGIAFEDVPITSRVFFGEPGPW  
FNQLDMDGDKTSVFHDVDGSVSEYPGSYLTKNNDNLVRHPDCINVPDWRGAICSGCYAQ  
MYIQAYKTSNLRMKIINKDFPSHPLYLEGALTRSTHYQQYQPVVTLQKGYTIHWDQTAP  
AELAIWLINFNKGDWIRVGLCYPRGTTFSILSDVHNRLKQTSKTVGVFVRTLQMDKVEQ  
SYPGRSHYYWDEDSGLLFLKLKAQNEREKFAFCSMKGCERIKIKALIPKNAGVSDCTAT  
AYPKFTERAVVDVPMPKKLFGSQLKTKDHFLEVKMESSKQHFFHLWNTFAYIEVDGKKY  
PSSSEDGIQVVVIDGNQGRVVSHTSFRNSILQIPWQLFNYVATIPDNSIVLMASKGRYV  
SRGPWTRVLEKLGADRGLKLKEQMAFVGFGKSFRPIWVTLDTEDEHKAKIFQVVPPIPVVK  
KKKL



Figure 13. Amino acid sequence of full-length ColoUp2 protein (SEQ ID NO: 14)

MPPFLLLEAVCVFLFSRVPPSLPLQEVHVSKEITIGKISAASKMMWCSAAVDIMFLLDGS  
NSVGKGSFERSKHFAITVCDGLDISPERVRVGAFQFSSTPHLEFPLDSFSTQQEVKARI  
KRMVFKGGRTETELALKYLLHRGLPGGRNASVPQILIIIVTDGKSQGDVALPSKQLKERG  
VTVFAVGVRFRPRWHEELHALASEPRGQHVLLEQVEDATNGLFSTLSSSAICSSATPDCR  
VEAHPCEHRTLEMVREFAGNAPCWRGSRRTLAVLAAHCPFYSWKRVFLTHPATCYRTTC  
PGPCDSQPCQNGGTCVPEGLDGYQCLCPLAFGEANCALKLSLECRVDLLFLLDSSAGT  
TLDGFLRAKVFKRFVRAVLSEDSRARVGVATYSRELLVAVPVGEYQDVPDLVWSLDGI  
PFRGGPTLTGSALRQAAERGFGSATRTGQDRPRRVVLLTESHSEDEVAGPARHARARE  
LLLLGVGSEAVRAELEETGSPKHVMVYSDPDLFNQIPELQKLC SRQRP GCRTQALD  
LVFMLDTSASVGPENFAQM QS FVRSCALQFEVNP DVTQVGLVVYGSQVQTAFGLDTKPT  
RAAMLRAISQAPYLGGVGSAGTALLHIYDKVMTVQRGARPGV PKAVVLTGGRGAEDAA  
VPAQKL RNNGISVLVVGVPVLSEGLRRLAGPRDSL IHVAAYADLRYHQDVLI EWLCGE  
AKQPVNLCKPSPCMNEGSCVLQNGSYRCKCRDGEWEGPHCENRFLRRP

**Figure 14.** Amino acid sequence of full-length Osteopontin protein (SEQ ID NO: 15)

MRIAVICFCLLGITCAIPVKQADSGSSEEKQLYNKYPDAVATWLNPDPSQKQNLLAPQT  
LPSKSNESHDMDDMDEDDDDHVDSQDSIDSNDSDDVDDTDDSHQSDESHHSDESDEL  
VTDFPTDLPATEVFTPVVPTVDTYDGRGDSVVYGLRSKSKKFRRPDIQYPDATDEDITS  
HMESEELNGAYKAIPVAQDLNAPSDWDSRGKDSYETSQLDDQSAETHSHKQSRLYKRKA  
NDESNEHSDVIDSQELSKVSREFHSHEFHSHEDMLVVDPKSKEEDKHLKFRISHELDSA  
SSEVN

**Figure 15.** Amino acid sequence of full-length ColoUp3 protein (SEQ ID NO: 16)

MGLPRGPIASLLLLQVCWLQCAASEPCRAVFREA EVTLEAGGAEQEPGQALGKVFMGCP  
GQEPALFSTDND DFTVRNGETVQERRSLKERNPLKIFPSKRILRRHKRDWV VAPISVPE  
NGKGPFPPQRLNQLKSNKDRDTKIFYSITGPGADSPPEGVFAVEKETGWLLL NKPLDREE  
IAKYELFGHAVSENGASVEDPMNISIIVTDQNDHKPKFTQDTRG SVLEGVLPGTSVMQ  
VTATDEDDAIYTYNGVVAYSIIHSQEPKDPHDLMFTIHRSTGTISV ISSGLDREKVPEYT  
LTIQATDMDGDGSTTTAVAVVEILDANDNAPMFD PQKYEAHVPENAVGHEVQRLTVTDL  
DAPNSPAWRATY LIMGGDDGDHFTITTHPESNQGILTTRKGLDFEAKNQHTLYVEVTNE  
APFVLKLPTSTATIVVHVEDVNEAPVFVPPSKVVEVQEGIPTGEPVCVYTAEDPDKENQ  
KISYRILRDPAGWLAMD PDSGQVTAVGTL DREDEQFVRNNIYEVMLAMDNGSPPTTGT  
GTLLLLTLIDVNDHGPVPEPRQITICNQSPVRQVLNITDKDLS PHTSPFQAQLTDDSDIY  
WTAEVNEEGDTVVL SLKKFLKQDTYDVHLSLSDHGNKEQLTVIRATVCDCHGHVETCPG  
PWKGGFILPVLGAVLALLFLLLVL LLLVLRKKRKIKEPLLLPEDDTRDNV FYYGEEGGGE  
EDQDYDITQLHRGLEARPEVVL RNDVAPTIIPTPMYRPRPANPDEIGNFIIENLKAANT  
DPTAPPYDTLLVFDYEGSGSDAASLSSLTSSASDQDQDYDYLNEWGSRFKKLADMYGGG  
EDD

**Figure 16.** Amino acid sequence of full-length ColoUp4 protein (SEQ ID NO: 17)

MKHLKRWWSAGGGLLHLTLLLSLAGLRVDLDLYLLLPPPTLLQDELLFLGGPASSAYAL  
SPFSASGGWGRAGHLHPKGRELDPAAPPEGQLLREVRALGVFPVPRTSVDAWLVHSVAA  
GSADEAHGLLGAAAASSTGGAGASVDGGSQAVQGGGDPRAARSGPLDAGEEEKAPAEF  
TAQVPDAGGCASEENGVLREKHEAVDHSSQHEENEERVSAQKENSLOQNDNDDENKIAEK  
PDWEAEKTTESRNERHLNGTDTSFSLLEDLFQLLSSQPENSLEGISLGDIPGPSISDGM  
NSSAHYHVNFSQLAISQDVNLHEAILLCPNNTFRRDPTARTSQSQEPFLQLNSHTTNPEQ  
TLPGTNLTGFLSPVDNHRNLTSQDLLYDLINIFDEINLMSLATEDNFDPIDVSQLF  
EPDSDSGLSLDSSHNNNTSVIKSNSSHSVCDEGAIGYCTDHESSSHHDLEGAVGGYYPEP  
SKLCHLDQSDSDFHGLTFQHVFNHTYHLQPTAPESTSEPPFPWPGKSQKIRSRYLEDT  
DRNLSRDEQRAKALHIPFSVDEIVGMPVDSFNSMLSRYLTDLQVSLIRDIRRRGKNKV  
AAQNCRKRLDIILNLEDDVCNLQAKKETLKREQAQCNKAINIMKQKLHDLYHDI FSRL  
RDDQGRPVNPNHYALQCTHDGSILIVPKELVASGHKKETQKGKRK

**Figure 17.** Amino acid sequence of full-length ColoUp5 protein (SEQ ID NO: 18)

MKLEVFVPRAAHGDKQGS DLEGAGGS DAPSPLSAAGDDSLGSDGDCAAKPSAGGGARDT  
QGDGEQSAGGGPGAEEAIPAAAAA VVAEGAEAGAAGPGAGGAGSGEGARSKPYTRRPK  
PPYSYIALIAMAIRDSAGGRLTLAEINEYLMGKFPFFRGSYTGWRNSVRHNLSLNDCFV  
KVL RDPSRPWGK DNYWMLNPNSEYTFADGVFRRRRKRLSHRAPVPAPGLRPEEAPGLPA  
APPPAPAAPASPRMRSPARQEERAS PAGKFSSSFAIDSILRKPFRRRLRDTAPGTTLQ  
WGAAPCPPLPAFFALLPAAPCRALLPLCAYGAGEPARLGAREAEVPPTAPPLLLAPLPA  
AAPAKPLRGPAAGGAHLYCPLRLPAALQAALVRRPGPHLSYPVETLLA

**Figure 18.** Amino acid sequence of full-length ColoUp6 protein (SEQ ID NO: 19)

MEKHHVPSDFNVNVKVDTGPREDLIKVLEDMRQEYELIIKKKHRDLDTWYKEQSAAMSQ  
EAASPATVQSRQGDIELKRTFQALEIDLQAQYSTKSALENMLSETQSRYSCKLQDMQE  
IISHYEEELTQLRHELERQNNYQVLLGIKTHLEKEITTYRRLLEGESEGTREESKSSM  
KVSATPKIKAITQETINGRLVLCQVNEIQKHA

**Figure 19.** Amino acid sequence of full-length ColoUp8 protein (SEQ ID NO: 20)

MDKSGIDSLDHVTSDAVELANRSDNSSDSSLFKTQCIPIYSPKGEKRNPIRKFVRTPESV  
HASDSSSDSSFEPILTIKAIFERFKNRKKRYKKKKKRRYQPTGRPRGRPEGRRNPIYS  
LIDKKKQFRSRGSGFPFLESENEKNAPWRKILTFEQAVARGFFNYIEKLKYEHHLKESL  
KQMNVGEDLENEFDSSRRYKFLDDGSIPIEESTAEDEDATHLEDNECDIKLAGDSFI  
VSSEFPVRLSVYLEEEDITEEAALSKKRATKAKNTGQRGLKM

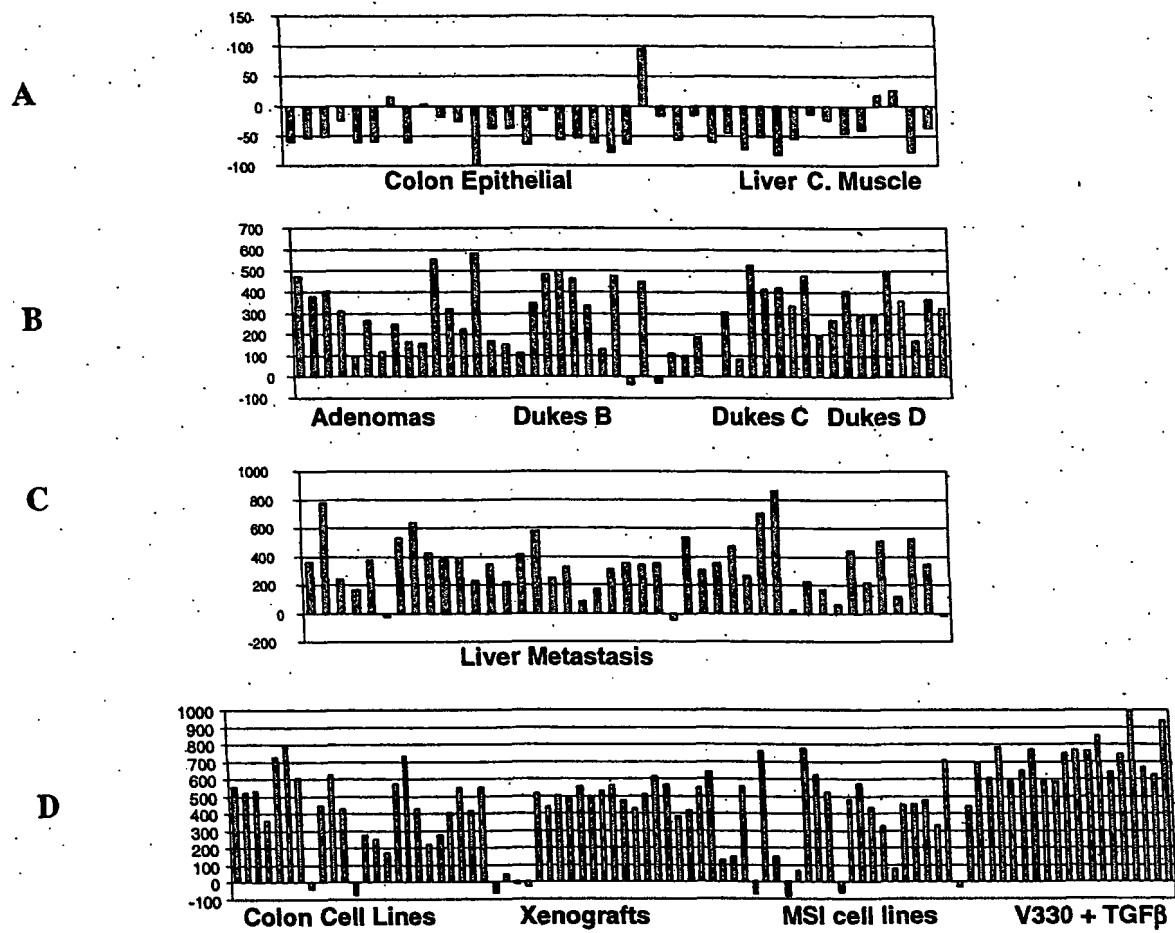
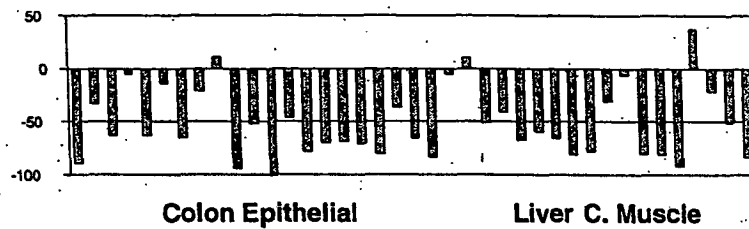


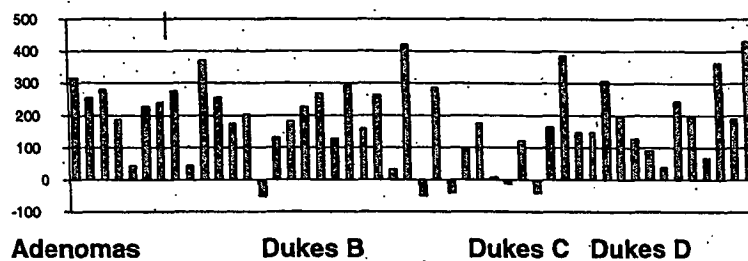
Figure 20



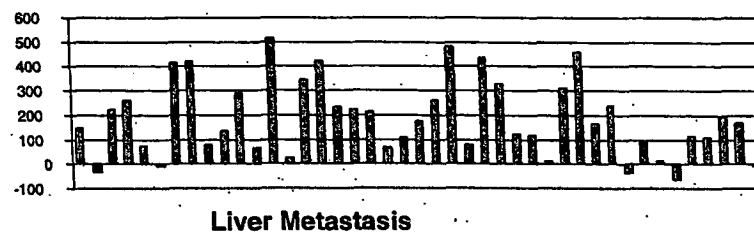
**A**



**B**



**C**



**D**

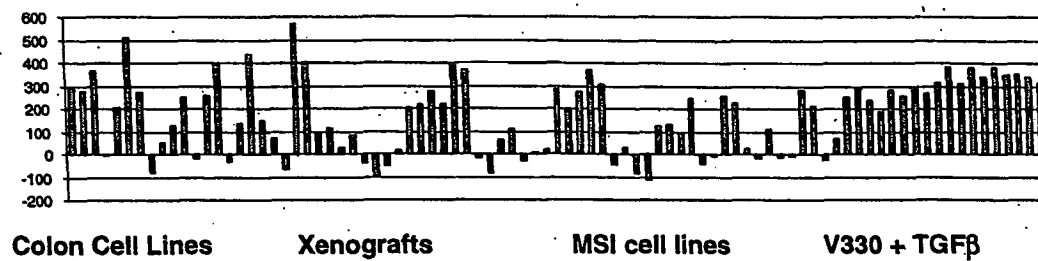
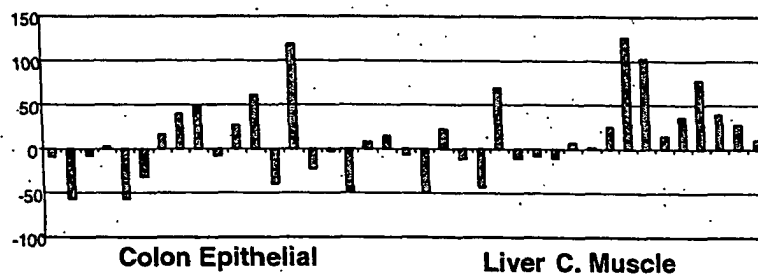
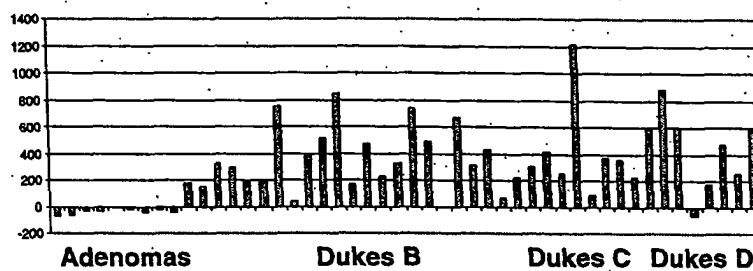


Figure 21

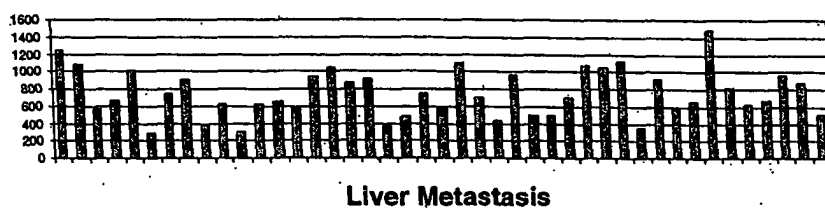
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**C**



**D**

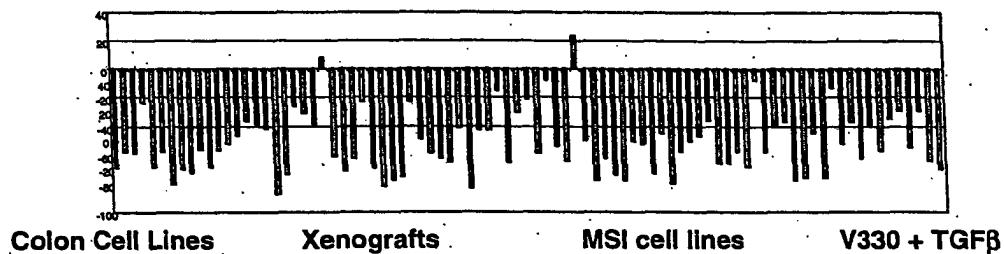
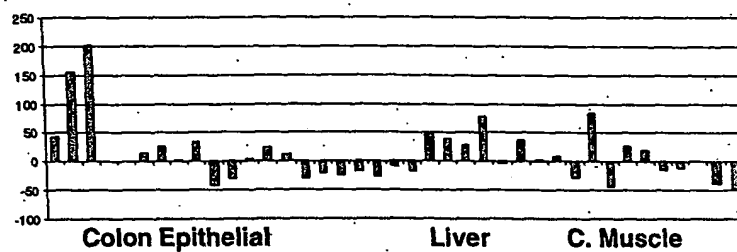
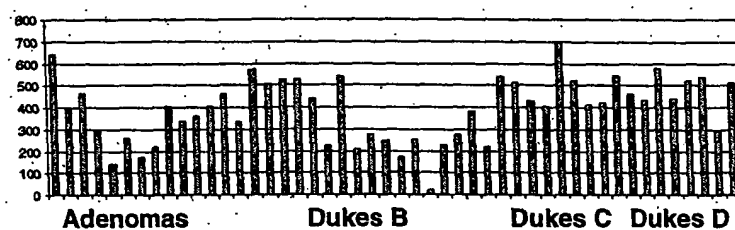


Figure 22

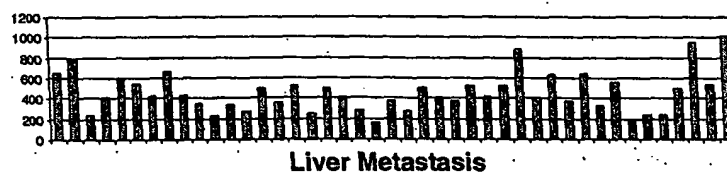
A



B



C



D

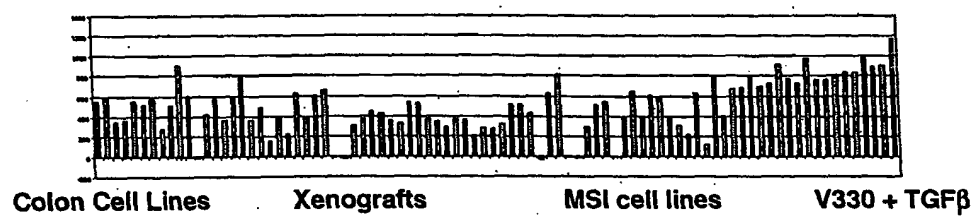
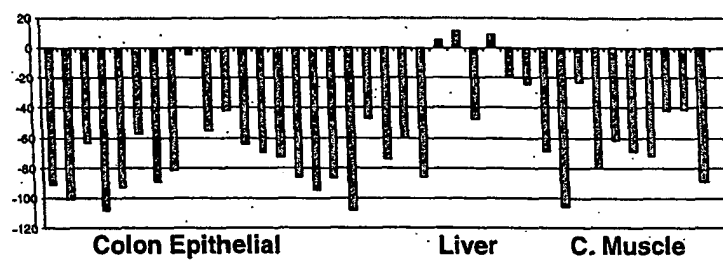
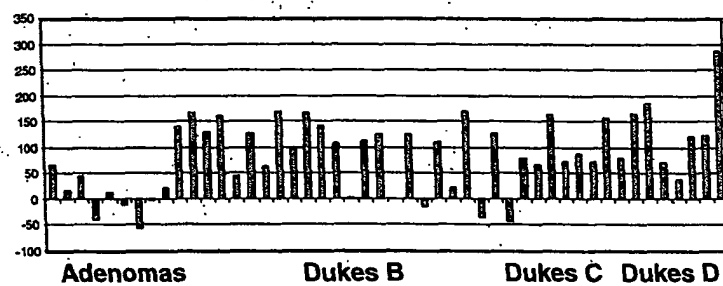


Figure 23

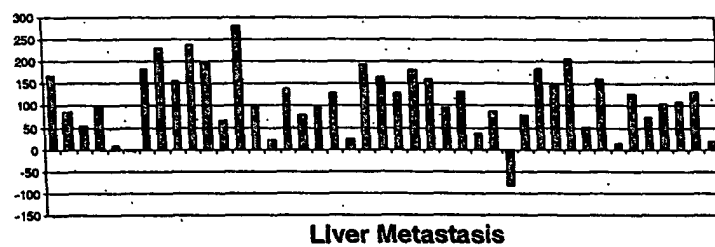
A



B



C



D

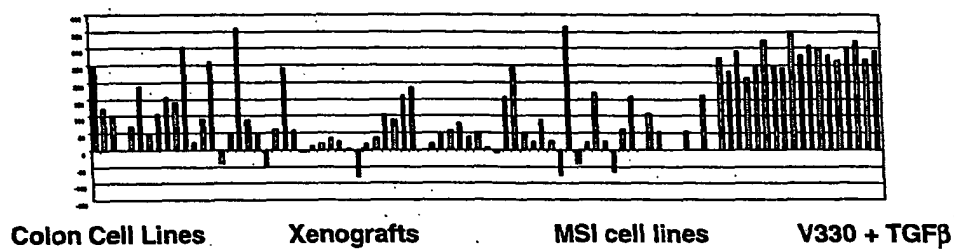
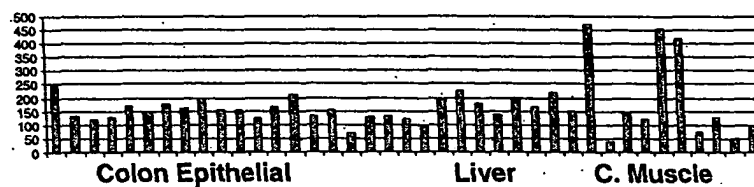
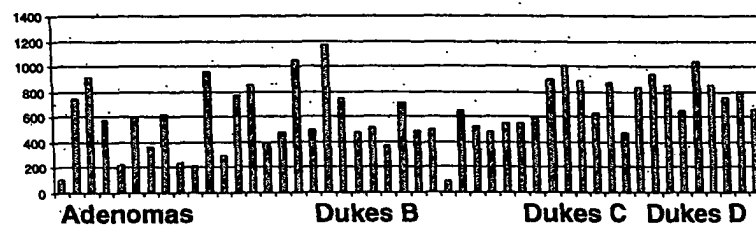


Figure 24

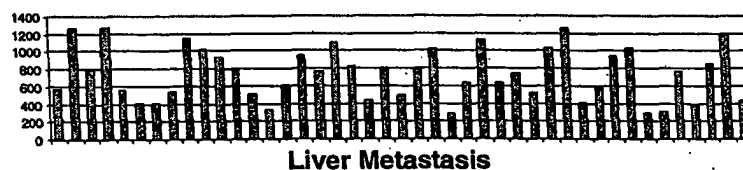
**A**



**B**



**C**



**D**

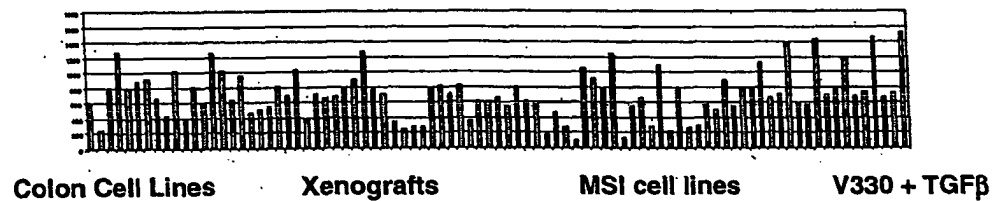
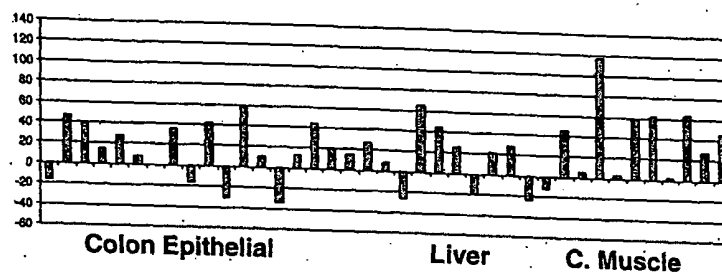
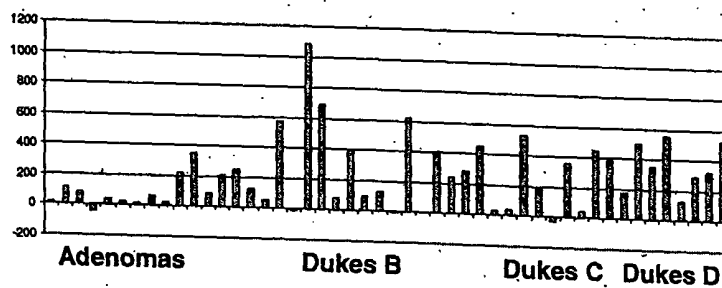


Figure 25

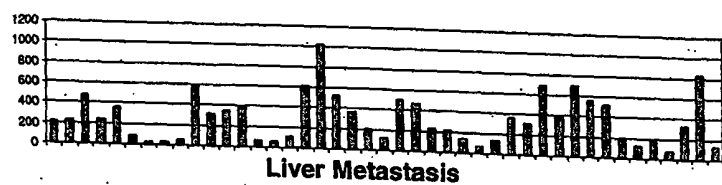
**A**



**B**



**C**



**D**

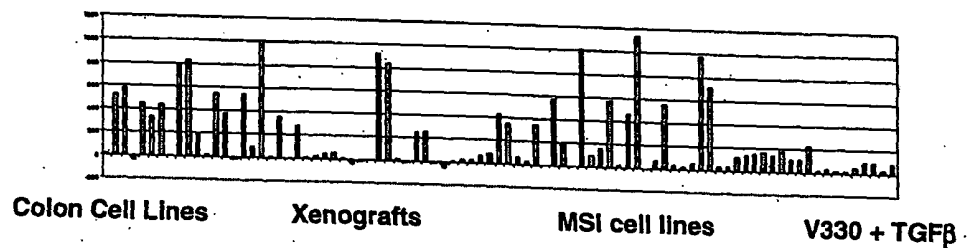
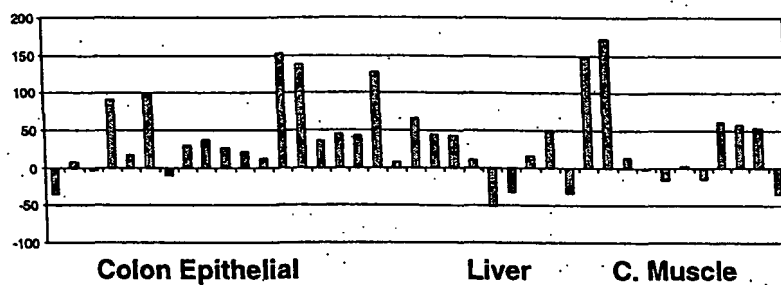
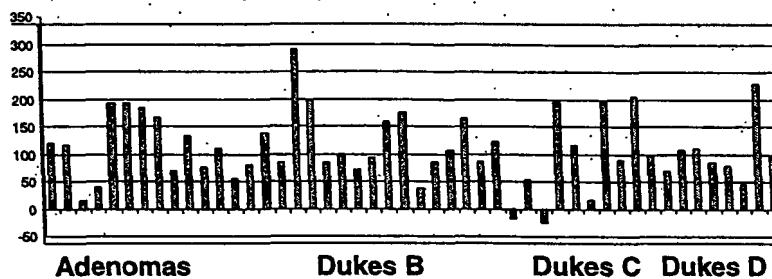


Figure 26

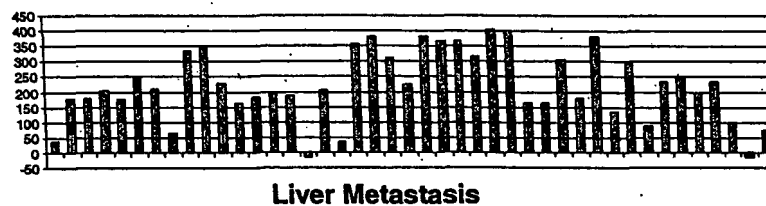
**A**



**B**



**C**



**D**

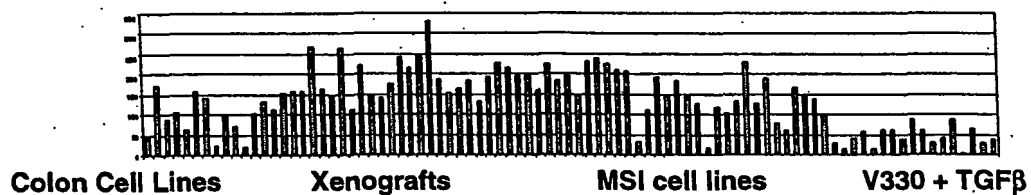
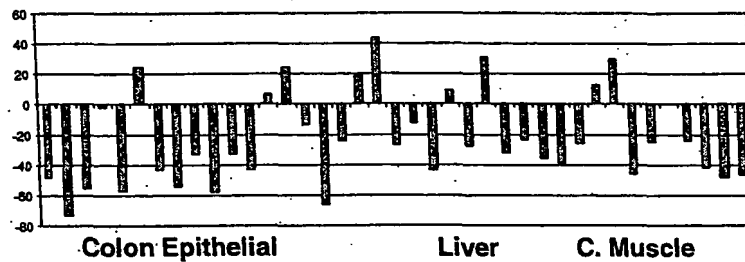
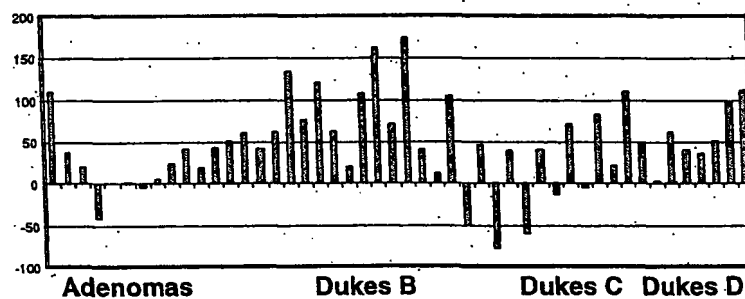


Figure 27

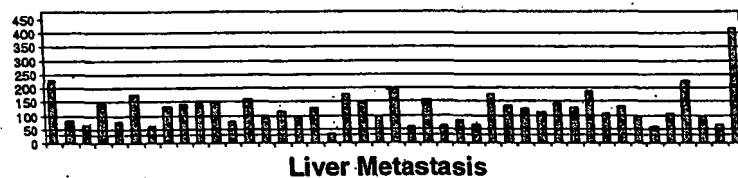
**A**



**B**



**C**



**D**

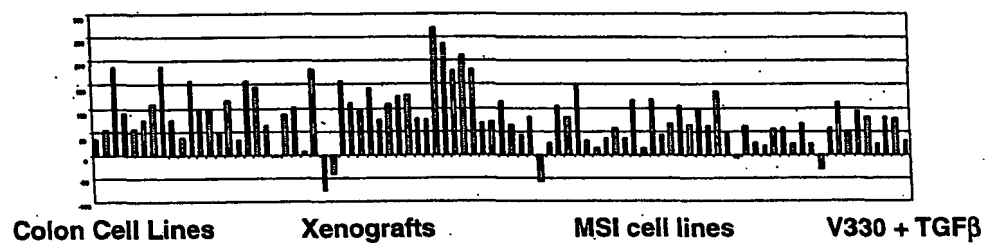
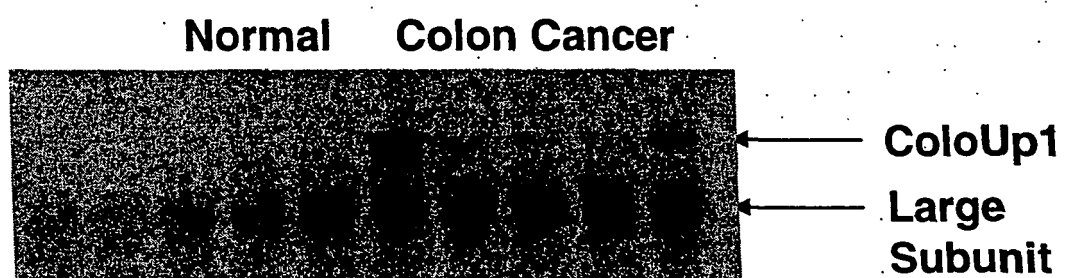


Figure 28

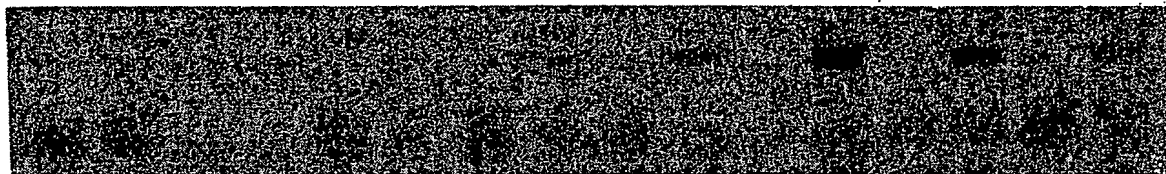




**Figure 29A**

**SAMPLE:**

<b>7774</b>	<b>7824</b>	<b>7583</b>	<b>8668</b>	<b>8677</b>	<b>8681</b>	<b>4253</b>	<b>4297</b>
<u><b>N</b></u>	<u><b>T</b></u>	<u><b>N</b></u>	<u><b>T</b></u>	<u><b>N</b></u>	<u><b>T</b></u>	<u><b>N</b></u>	<u><b>T</b></u>



**Figure 29B**

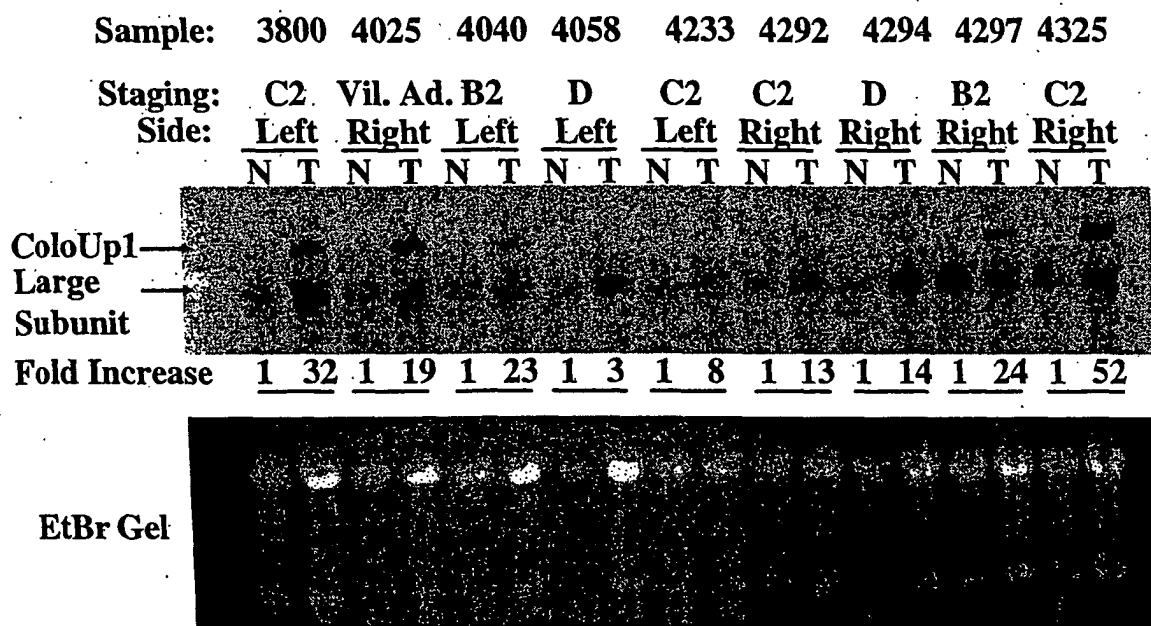


Figure 29C

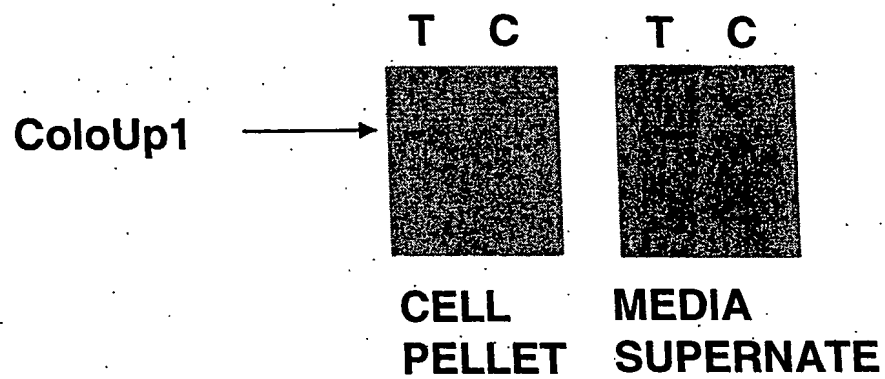


Figure 30A

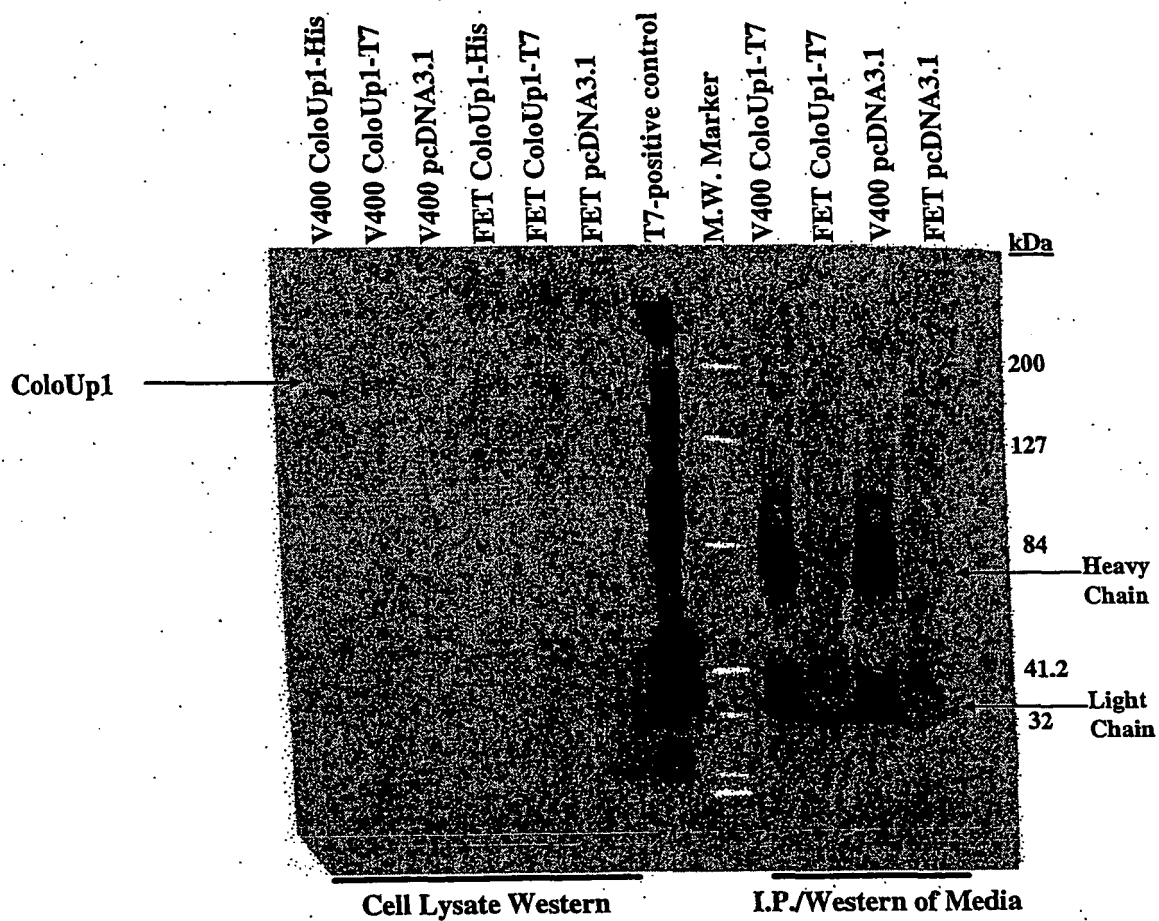


Figure 30B

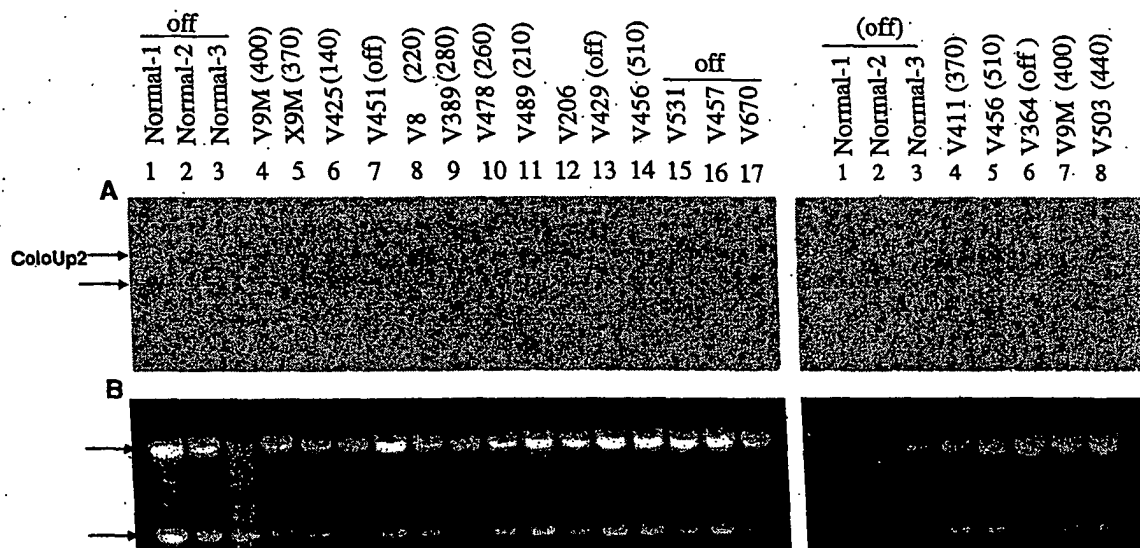


Figure 31

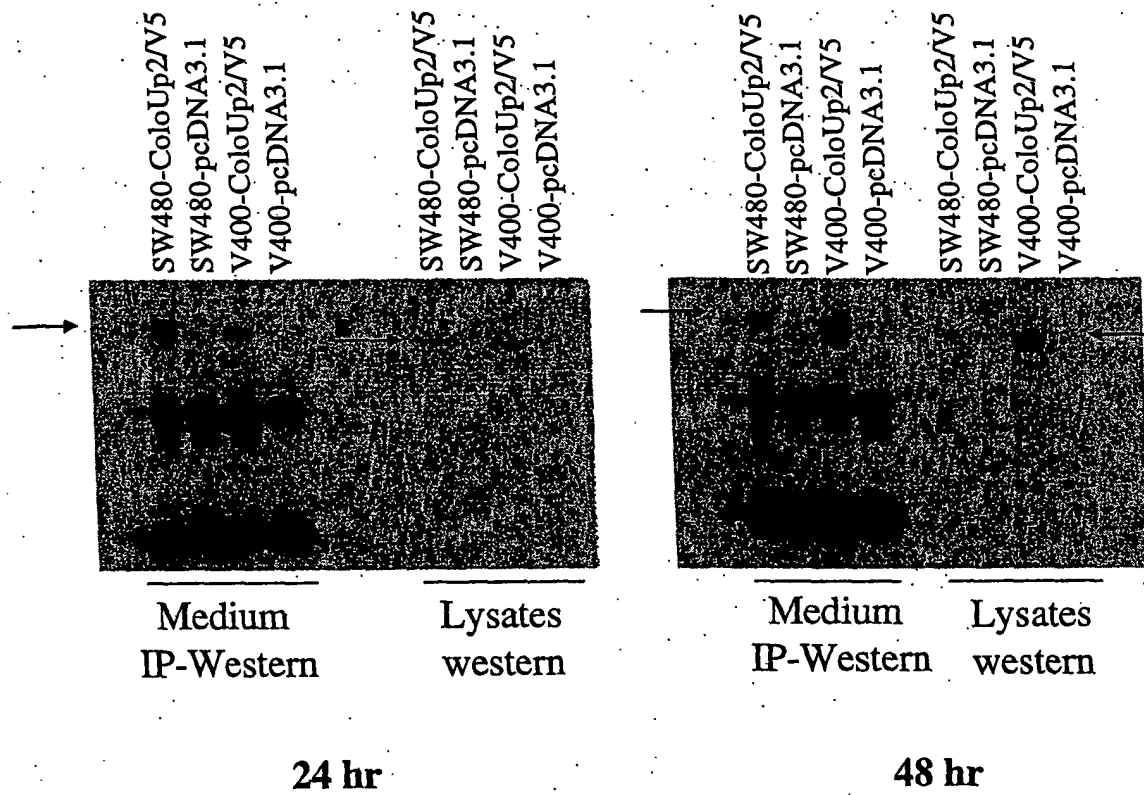


Figure 32

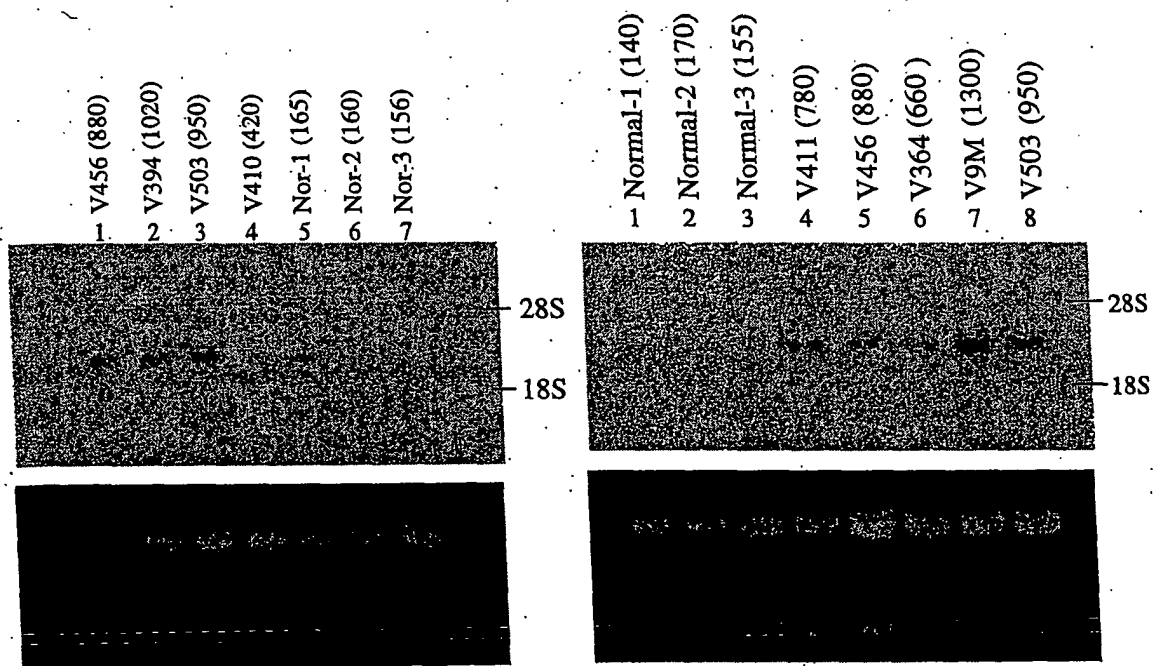


Figure 33



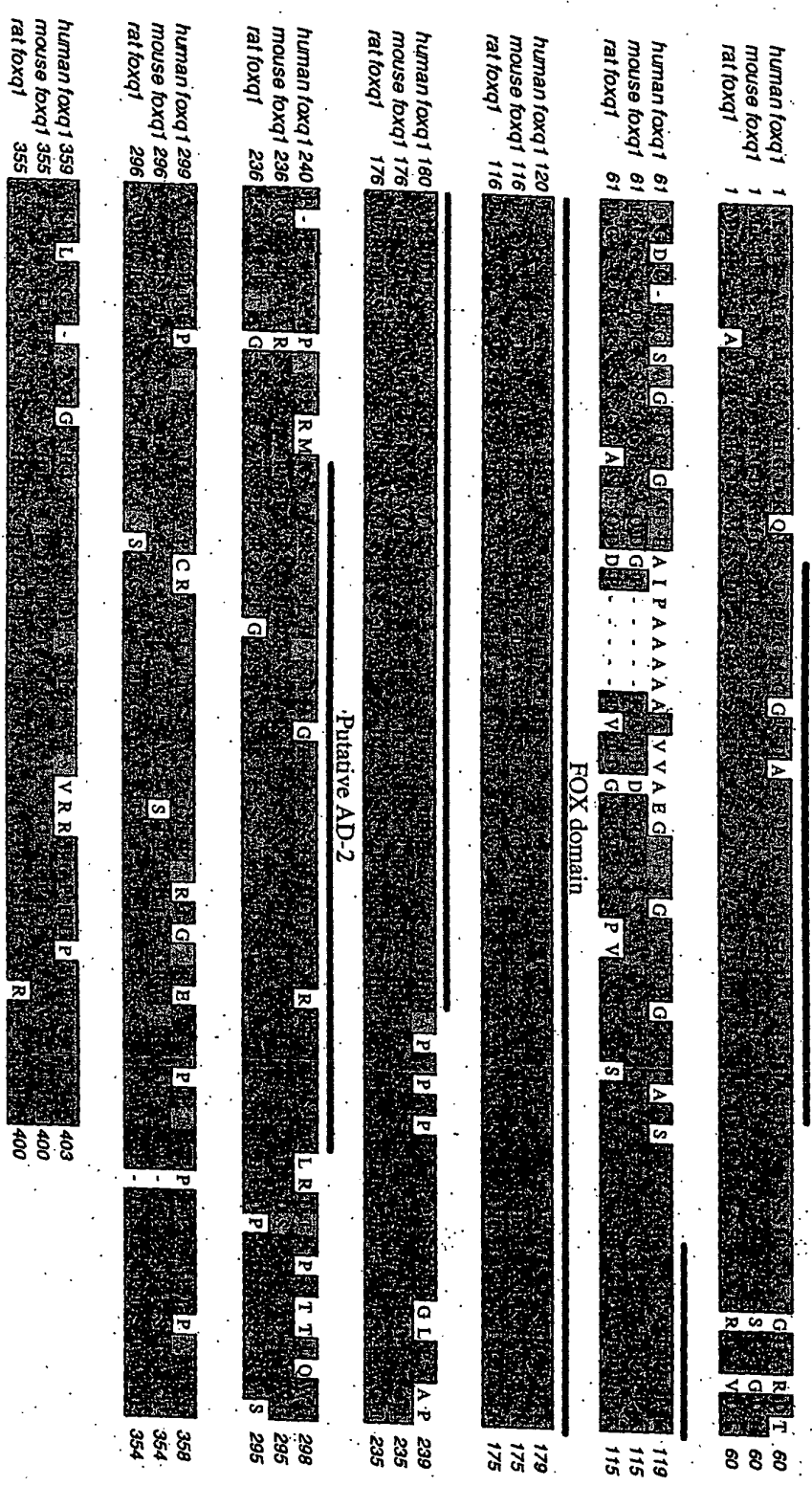


Figure 34

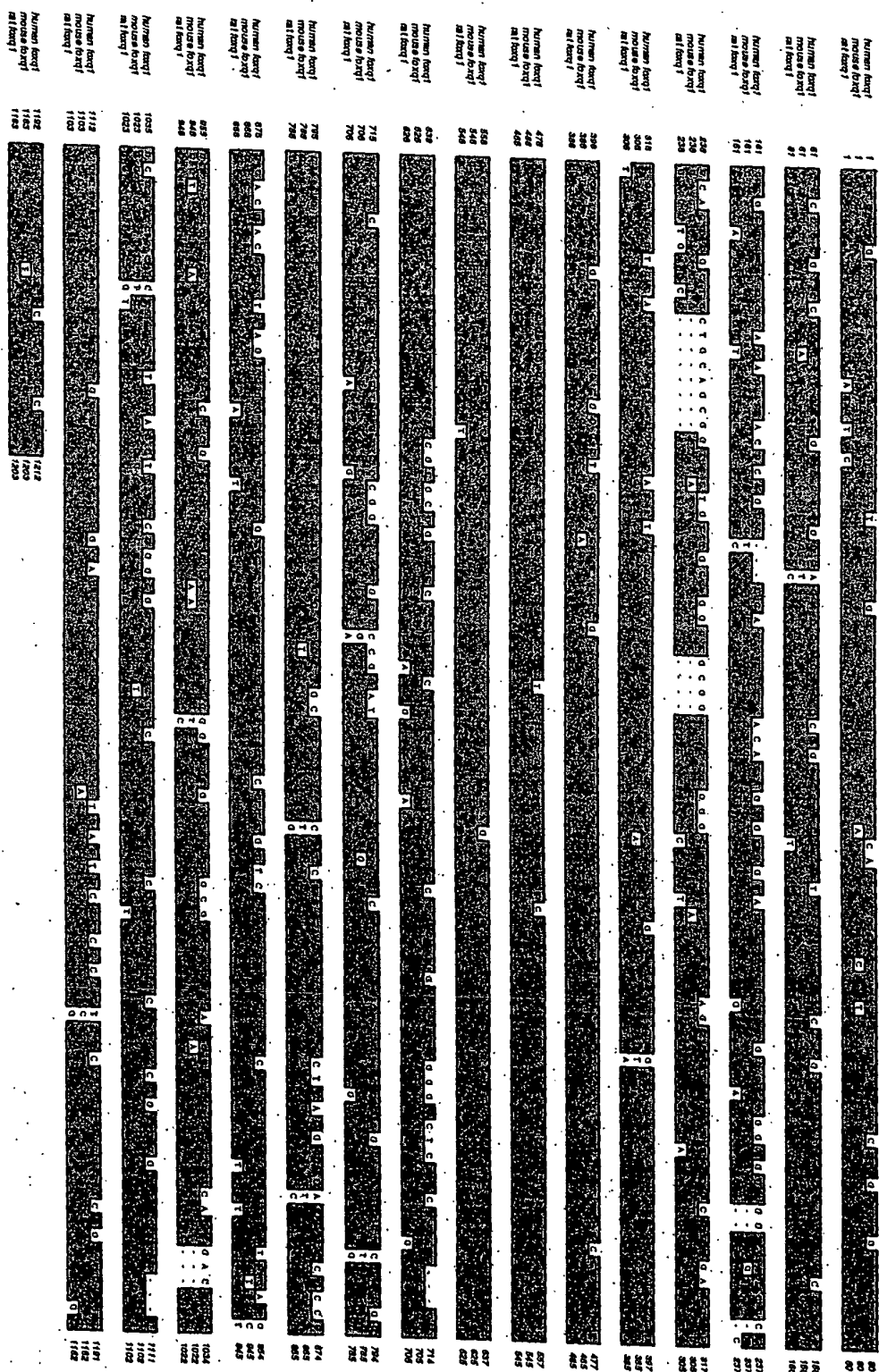


Figure 35

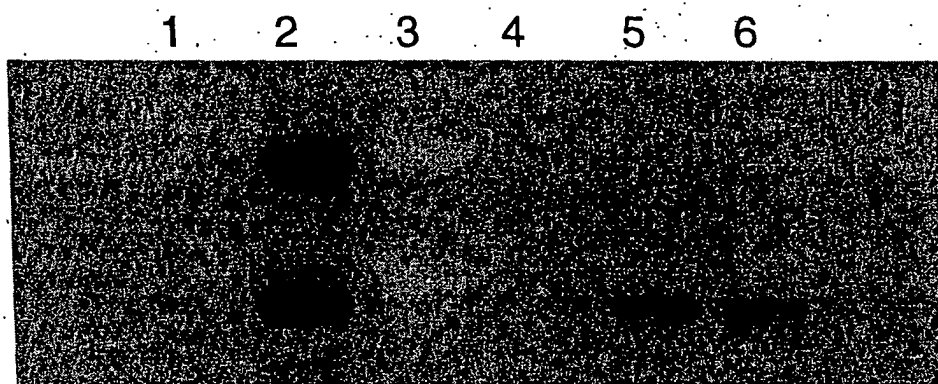


Figure 36

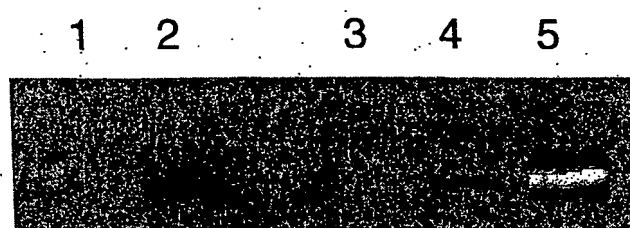


Figure 37

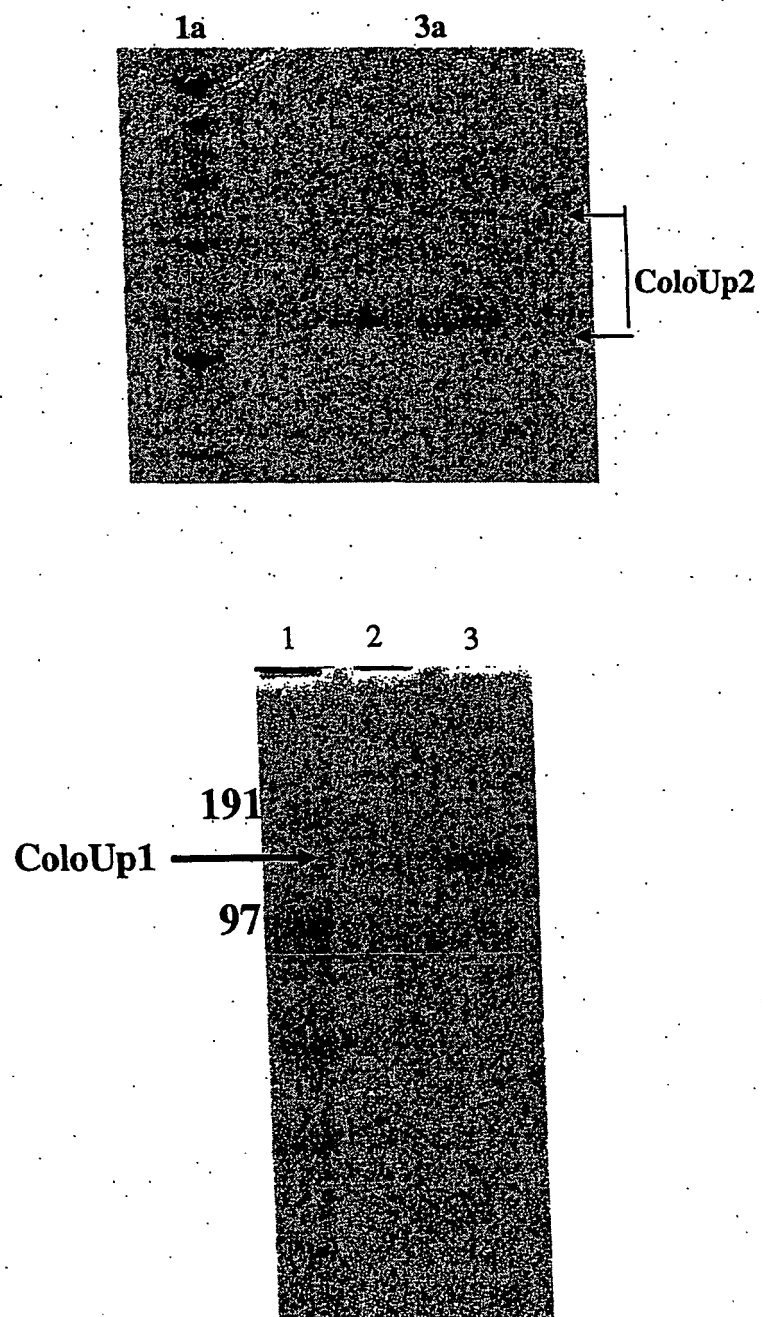
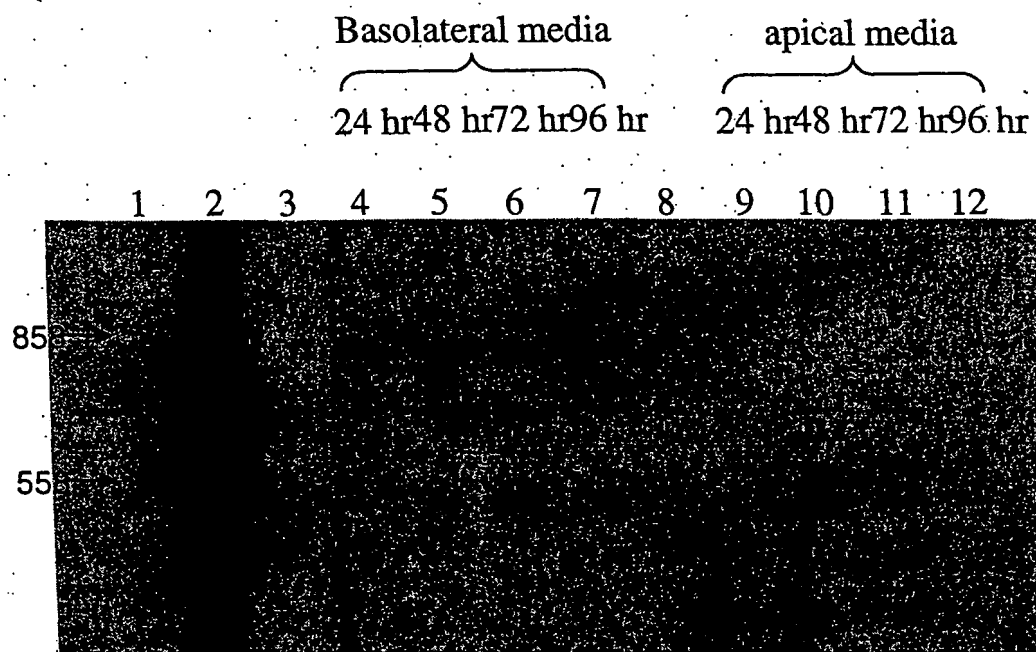
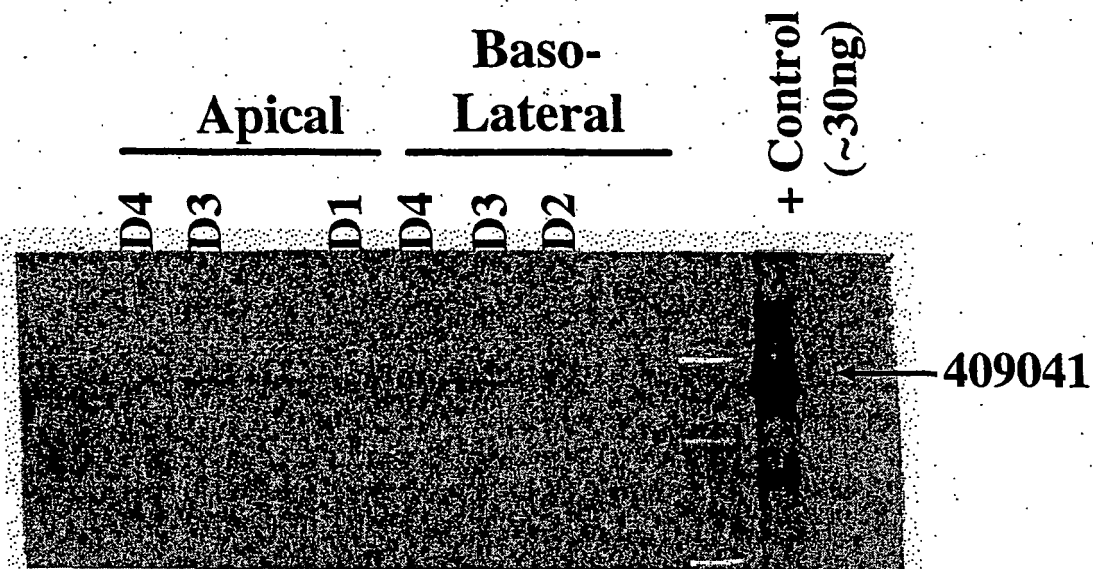


Figure 38



time points(hr)	resistance	transfection efficiency
0	220	N/A
24	199	15%
48	184	25%
72	220	30%
96	214	30%

Figure 39



Day	Resistance	% GFP Exp.
0	300	0
1	415	10
2	260	20
3	206	25
4	218	25

Figure 40

### Amino Acid Sequence of a Secreted C-terminal Portion of ColoUp2

AVLAAHCPFYSWKRVFLTHPATCYRTTCPGPCDSQPCQNGGTCVPEGLDGYQCL  
CPLAFGGEANCALKLSLECRVDLLFLLDSSAGTTLDGFLRAKVFKRFVRAVLSE  
DSRARVGVATYSRELLVAVPVGEYQDVPDLVWSLDGIPFRGGPTLTGSALRQAA  
ERGFGSATRTGQDRPRRVVLLTESHSEDEVAGPARHARARELLLLGVGSEAVR  
AELEEITGSPKHVMVYSDPQDLFNQIPELQGKLCRQRPGCRTQALDLVFMLDTS  
ASVGPFENFAQMMSFVRSCALQFEVNPDTVQVGLVVYGSQVQTAFGLDTKPTRA  
AMLRAISQAPYLGGVGSAGTALLHIYDKVMTVQRGARPGVPAVVVLTGGRGA  
EDAAVPAQKLRNNGISVLVVGVPVLSEGLRRLAGPRDSLHVAAYADLRYHQD  
VLIEWLCGEAKQPVNLCKPSPCMNEGSCVLQNGSYRCKCRDGWEGPHCENRFL  
RRP (SEQ ID NO:21)

Figure 41